VMware Stage Manager User's Guide

Stage Manager 1.0

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About This Book

The *VMware Stage Manager User's Guide* describes VMware® Stage Manager and its components, commands, operations, configuration, and user interface.

Intended Audience

The guide is intended for IT administrators, developers, and testing engineers. The IT administrator might be a VMware Infrastructure administrator.

This document assumes the user has some familiarity with these topics:

- Virtual machine technology
- Basic concepts of distributed, multitiered systems
- Current IT lifecycle practices
- Windows and Linux operating systems

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Technical Support and Education Resources

The following sections describe the technical support resources available to you. To access the current versions of this book and other books, go to:

http://www.vmware.com/support/pubs.

Online and Telephone Support

Use online support to submit technical support requests, view your product and contract information, and register your products. Go to:

http://www.vmware.com/support

Customers with appropriate support contracts should use telephone support for the fastest response on priority 1 issues. Go to:

http://www.vmware.com/support/phone_support.html

Support Offerings

Find out how VMware support offerings can help meet your business needs. Go to:

http://www.vmware.com/support/services

VMware Education Services

VMware courses offer extensive hands-on labs, case study examples, and course materials designed to be used as on-the-job reference tools. For more information about VMware Education Services, go to:

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Getting Started

Stage Manager Infrastructure and the Service Lifecycle

1

Stage Manager organizes systems in the enterprise software lifecycle into services. These services represent the deliverables of IT separated into stages that span development and testing through production. Stage Manager increases IT service availability, accelerates response to configuration changes, promotes compliance with regulatory or workflow processes, and promotes efficient use of storage.

This chapter includes these topics:

- "Visualizing the Enterprise Service Lifecycle" on page 15
- "Understanding Stage Manager in the VMware Infrastructure Environment" on page 17

Visualizing the Enterprise Service Lifecycle

IT organizations use Stage Manager to visualize the capabilities or services they provide to the business. A modern IT service, delivered by an enterprise application, consists of a group of machines which cooperate to deliver a function. In Stage Manager, each service is organized into stages that contain the virtual machines (grouped into multiple virtual machine units called configurations) providing that service. IT breaks services into stages for several reasons:

- A software revision might take an extended period of time, even months, for a single change.
- An operating system patch is required that risks breaking a live enterprise service. You must test this patch before applying it to production.

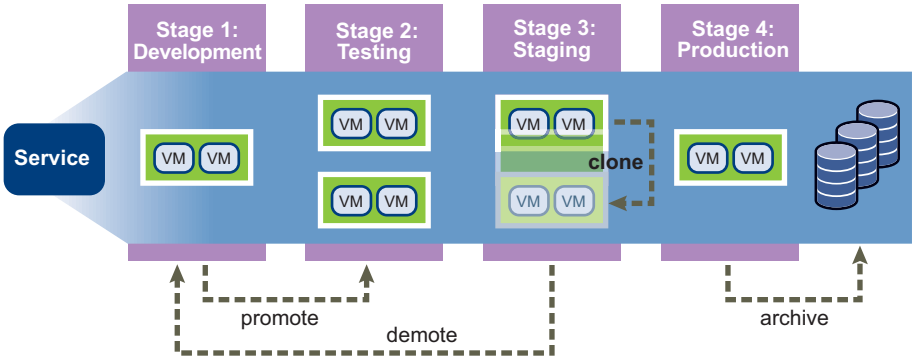
- Regulatory or IT processes require different levels of access controls at different stages of the application lifecycle.
- Best practices, including the Information Technology Infrastructure Library (ITIL) framework, advise you to use a staged process when bringing new services or changes to existing services to production.

Stage Manager also provides an archive to store services. If an audit requires you to show the exact state of your software years ago, you can turn to the service archive.

View of the Lifecycle Stages

Stage Manager displays stages to organize the service path to production, as shown in Figure 1-1.

Figure 1-1. Sample Stages



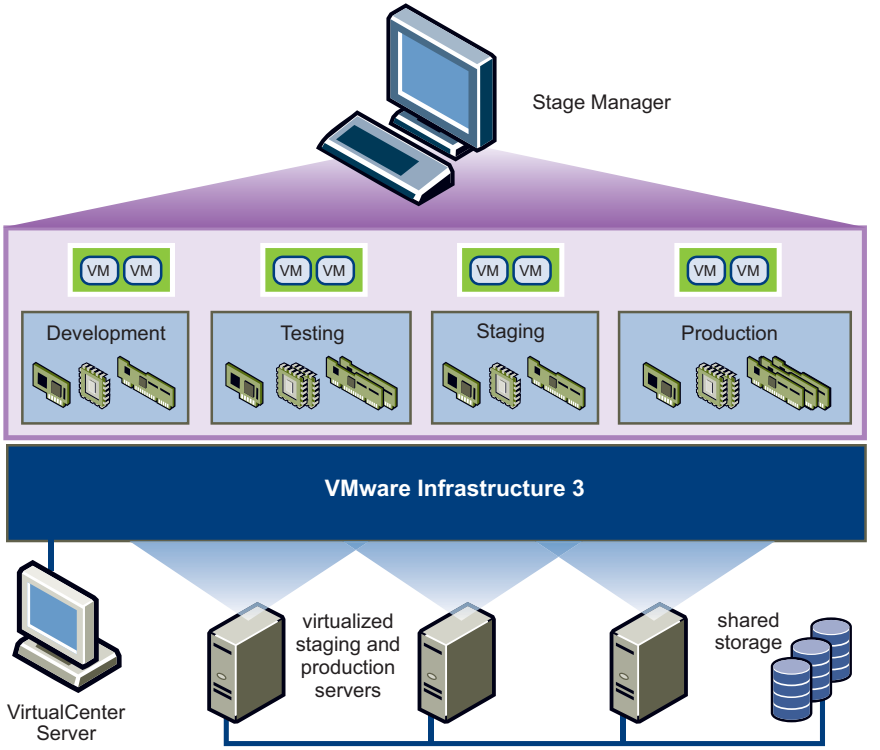
Each stage can contain copies of configurations that reflect the progression of the application toward IT production. Stage Manager provides operations, such as promoting or demoting a configuration, that move configurations through the various stages.

You can customize stages or use default stages to enhance the production process. For example, the user acceptance testing group might locate a bug in a pre-production stage and move the virtual software configuration back to an integration stage.

Understanding Stage Manager in the VMware Infrastructure Environment

Stage Manager is an application that resides on and leverages the VMware Infrastructure product. See Figure 1-2 for a view of the larger VMware environment.

Figure 1-2. Stage Manager in the VMware Infrastructure Environment



The Stage Manager Server system provides centralized deployment and management of service configurations against a collection of resource pools provided by the VirtualCenter Server.

VMware ESX Server provides resources to run the virtual machines. The icons that appear in the blue lifecycle stages of the figure represent resource pools. See "Using Clusters, Hosts, Resource Pools, and Datastores" on page 18. Stage Manager manages the ESX Server hosts through the VirtualCenter Server and Stage Manager agent installed on those hosts.

VMware VirtualCenter Server is a control point for the datacenter and provides datacenter services such as access control, performance monitoring, and configuration. VirtualCenter also provides advanced VMware Infrastructure capabilities described in "Leveraging VMware Infrastructure Capabilities" on page 19. ESX Server hosts continue to function even if the VirtualCenter Server becomes unreachable (for example, the network connection is severed).

Using Clusters, Hosts, Resource Pools, and Datastores

In VirtualCenter Server, you can view, configure, and manage these key elements:

- Computing and memory resources called hosts, clusters, and resource pools
- Storage resources called datastores
- Networks
- Virtual machines

See VMware Infrastructure 3 documentation at http://www.vmware.com/support/pubs/vi_pages/vi_pubs_35.html.

In Stage Manager, you can assign resource pools to individual stages in services to partition available CPU and memory resources. Hosts, clusters, and resource pools provide flexible ways to organize the aggregated computing and memory resources in the virtual environment and link them back to the underlying physical resources. Review these definitions:

- A host represents the aggregate computing and memory resources of a physical x86 server.
- A cluster acts and can be managed much like a host. It represents the aggregate computing and memory resources of a group of physical x86 servers sharing the same network and storage arrays.
- Resource pools are partitions of computing and memory resources from a single host or a cluster. With VMware Distributed Resource Scheduler, these pools can be hierarchical and nested.

In addition to assigning resource pools to a stage, use Stage Manager to monitor resource consumption at the service and stage level.

Leveraging VMware Infrastructure Capabilities

Stage Manager leverages VMware Infrastructure capabilities such as VMware VMotion™, VMware DRS, and VMware High Availability. These are distributed services that enable efficient and automated resource management and high virtual machine availability.

Stage Manager works with virtual machines registered with VirtualCenter and VMware Infrastructure admission controls. For more information about VirtualCenter, see VMware Infrastructure 3 documentation at http://www.vmware.com/support/pubs/vi_pages/vi_pubs_35.html.

Guidelines for VirtualCenter and Stage Manager

Stage Manager functions alongside most activity in VirtualCenter. If a particular operation in VirtualCenter has potential impact on a Stage Manager user, Stage Manager alerts users and provides recommendations when possible.

WARNING VirtualCenter users must not manipulate portgroups created by Stage Manager because of potential consequences on fenced configurations. For information about fencing, see Appendix C, "Network Fencing," on page 181.

Review these sample situations that trigger a message in Stage Manager about VirtualCenter activity:

- Someone removes a resource pool managed by Stage Manager in VirtualCenter.
- A host managed by Stage Manager enters maintenance mode because of Virtual Infrastructure administration.
- Someone moves a host managed by Stage Manager to a different cluster or completely removes the host using VirtualCenter.
- A datastore managed by Stage Manager becomes inaccessible.
- A virtual machine managed by Stage Manager is unregistered in VirtualCenter.
- A virtual machine managed by Stage Manager is moved by VMotion to a host not managed by Stage Manager.

Contact the VMware Infrastructure administrator to resolve most of these situations.

Using the Stage Manager Web Console 2

To get started with Stage Manager, you can become familiar with the main elements and operations of the Stage Manager Web console.

This chapter includes these topics:

- "Setting Browser Options" on page 21
- "Accessing the Stage Manager Web Console" on page 21
- "Reviewing Key Areas of Stage Manager" on page 22
- "Reviewing User Roles" on page 25
- "Setting User Preferences" on page 25

Setting Browser Options

Review the requirements for client machines accessing the Web console in the *VMware Stage Manager Installation Guide*. Review the list of supported browsers and operating systems in Appendix A, "Client and Browser Support," on page 173.

If you use Internet Explorer, enable the proper browser settings described in the *VMware Stage Manager Installation Guide*.

Accessing the Stage Manager Web Console

Access the Stage Manager Web console using Internet Explorer or Firefox. Supported browsers are listed in Appendix A, "Client and Browser Support," on page 173.

A Stage Manager administrator must set up a user account to log in to the Web console.

To access the Stage Manager console

1 Obtain a Stage Manager account.

If you do not have an account or need account information, see a Stage Manager administrator.

2 On a Windows machine connected to the Internet or your local intranet, open a browser window.

3 To connect to a Stage Manager Server system, navigate to `https://<Stage_Manager_Server_domain_name_or_IP_address>/`.

The first time you access the console, an SSL warning might appear. To avoid this warning, use a fully qualified domain name (FQDN) or ask the Stage Manager administrator for more information. An FQDN starts with the computer name followed by the DNS suffix (for example, `computer_name.mydomain.com`).

To add the certificate to your trusted certificate list in Internet Explorer, click **View Certificate** in the SSL alert, and click **Install Certificate**. For information about installing a certificate, see the *VMware Stage Manager Installation Guide*.

4 Enter your user name and password.

Reviewing Key Areas of Stage Manager

The navigation pane provides access to major working areas:

- **Service Management** – Service operations that include operations restricted to Stage Manager administrator and service administrators.
- **Monitoring** – The **Resource Usage** and **Deployed Machines** areas appear only for Stage Manager administrators.
- **Administration** – Operations restricted to Stage Manager administrators.
- **Help** – Resources that include an introduction to Stage Manager and up-to-date product documentation on the VMware Web site.

Introduction to Stage Manager in the Web Console

The Getting Started page is the default landing page in the Web console. The page displays an overview of the service lifecycle or path to production for an IT deliverable. Review the information on Stage Manager objects and user roles.

To open the Services page instead of the Getting Started page when you launch the Web console, click the **Open Services at startup** check box.

Specific Areas and Operations

The Stage Manager Web console includes these areas and operations:

- **Services** – Shows the IT deliverables that enable business processes. The capabilities of services are primarily delivered in a production-level context. A service has a Service Level Agreement (SLA) associated with it, and the maintenance of that service is a priority.

  A service in Stage Manager contains virtual configurations. A virtual configuration contains virtual machines and resides either in a stage of the service lifecycle or the service archive.

  Different information and operations are visible depending on whether you are a Stage Manager administrator, service administrator, or service user. See "Reviewing User Roles" on page 25.

  - **Lifecycle** – Shows the stages of a service. A stage is the phase of the IT lifecycle (for example, development or user acceptance testing). The copies of virtual configurations in each stage reflect the progression of the application toward the production-level context.

    From this location, perform configuration operations, navigate to details on virtual machines in a configuration, and navigate to change summaries for a configuration. You can move configurations to other stages, services, or the archive.

  - **Archive** – Stores virtual configurations that you need to preserve in-state (for example, an application prior to a new integration project).

    From this location, you can perform configuration operations, navigate to details on virtual machines in a configuration, and navigate to change summaries for a configuration. You can clone configurations to other stages or move configurations to other services.

- **Dashboard** – Provides statistics on Stage Manager resources and usage.

- **Activity Log** – Displays the status of operations. Most Stage Manager operations occur immediately (synchronously). During an asynchronous operation that can take an extended period of time, you can perform other tasks in the Web console and return to the activity log to check the status.

  From this location, you can access details on a particular operation.

- **Resource Usage** – Shows CPU and memory information for resource pools, services, and stages. This information is visible to Stage Manager administrators only.
- **Deployed VMs** – Provides details on deployed virtual machines and access to individual virtual machine consoles. This information is visible to Stage Manager administrators only.

See Chapter 3, "Managing and Configuring Stage Manager," on page 31 for all areas of Stage Manager administration, such as service, template, and media management, user roles, resource allocation (resource pools, hosts, and datastores), network settings, and a range of system-wide settings for LDAP, licensing, deployment and storage leases, VirtualCenter, and more.

Interface Features

The Stage Manager interface includes features such as pop-up menus and filters.

Pop-up Menus

The console has pop-up menus that are similar to right-click menus and appear when you move the pointer over an object name. A name has a pop-up menu if an arrow appears to its right.

Text Search Filter

Use the **Filter** button at the top of certain pages to view a subset of the information on the current page. Stage Manager matches the text entered in the field to the left of the button against the attribute data of the search objects. Entries are not case sensitive.

Using the pop-up menu to the left of the field, you can filter across all columns on the page or within a specific column.

The filter text search does not recognize wildcards. If you enter a traditional wildcard, such as an asterisk (*), this function performs a literal search for an asterisk symbol.

Column Sorting

Most pages in Stage Manager present data in tables. You can sort the data in each column in ascending or descending order. Click the table heading name to perform the sort operation. The arrow to the right of the column name indicates whether the data appears in descending or ascending order.

Sample Service, Configuration, and Template in Stage Manager

The Stage Manager Web console provides the **Sample Service**, **Sample Configuration**, and **ttylinux-4-ESX3** objects. Use this service, configuration, and template to see how operations occur without the time-consuming process of creating objects from scratch.

The first time you deploy a template or configuration to view a virtual machine console, you must follow the instructions to install the ActiveX control. See "Accessing a Virtual Machine Console for the First Time" on page 145.

After the ActiveX installation, you can log in to a virtual machine console of the sample template as root and use `password` as the password.

Reviewing User Roles

Stage Manager provides these user roles:

- **Stage Manager administrator** – Individuals who are likely to map to the VMware Infrastructure administrator role in most organizations. The responsibilities of the Stage Manager administrator spans the entire Stage Manager installation. Only Stage Manager administrators can create services and templates.
- **Service administrator** – Individuals responsible for the delivery of a particular service to the larger organization. They can work with configurations in all stages of the particular service, but cannot access services outside his administration.
- **Service user** – Developers or others who have access to a limited set of stages in a particular service, but do not have permission to alter the production infrastructure.

Only Stage Manager administrators can create and modify users. See "Managing Users" on page 64.

Setting User Preferences

You set a range of user preferences. Use the **Preferences** link in the upper-right corner of any page (next to the **Logout** link) to access settings in the **Defaults** tab and **Change Password** tab.

The **Defaults** tab includes default display and deployment options.

To configure default display and deployment options

1 Set the first page to appear after logging in.

2 To prevent the display of information that usually appears at the top of the each page, deselect the **Show Page Header by Default** check box

This information includes IP addresses, virtual machine descriptions, and snapshot thumbnails. Removing the header gives you more room to view the console.

3 Enter a number of rows to display on pages with tabular format.

The maximum number is 500. The default number is 20.

4 Set a network architecture mode for deploying configurations:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.
- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

See Appendix C, "Network Fencing," on page 181.

5 To boot virtual machines in the sequence specified during the creation of the configuration, select the **Use Server Boot Sequence** check box.

6 Enter the default value for the delay time (or "pause") between booting each virtual machine in a configuration.

Stage Manager uses this default value when the user creates a new configuration or adds a virtual machine to an existing configuration.

7 Click **OK**.

The **Change Password** tab sets passwords. You cannot use Stage Manager to change an LDAP account password. Only Stage Manager administrators can set up LDAP preferences. See "Microsoft Active Directory and Stage Manager" on page 98.

To set passwords

1 Enter a password and confirm it.

2 Click **Change Password**.

Stage Manager Administration

Managing and Configuring Stage Manager

3

Use the Stage Manager Web console to manage your Stage Manager environment. The operations in this chapter are restricted to Stage Manager administrators.

This chapter includes these topics:

- "Managing Services" on page 32
- "Managing Virtual Machine Templates" on page 34
- "Importing Virtual Machines from VirtualCenter to New and Existing Configurations" on page 61
- "Managing Media" on page 63
- "Managing Users" on page 64
- "Managing Resources" on page 69
- "Configuring Network Settings" on page 90
- "Configuring Stage Manager Settings" on page 94
- "Managing VirtualCenter and Datacenters" on page 105
- "Performing Force Operations" on page 109

Managing Services

Only Stage Manager administrators can set up the default service template that serves as the basis of new services, create services, and delete services.

For information about other service operations, see Chapter 4, "Working with Services," on page 115.

Preparing the Service Template

Stage Manager administrators can prepare the default template for new services by adjusting stage names, order, and properties, creating new stages, and deleting stages.

To prepare the service template

1 In the left pane, click **Service Template**.

2 To adjust the order of stages, move the pointer over a stage name and choose **Move up** or **Move** down from the menu.

3 To delete a stage, move the pointer over a stage name and choose **Delete** from the menu.

4 To add a new stage, click **New Stage**. See "Creating Stages in the Service Template" on page 32.

5 To adjust stage parameters, move the pointer over a stage name and choose **Properties** from the menu. See "Editing Stage Properties for the Service Template" on page 33.

Creating Stages in the Service Template

You can create stages in the service template.

To create a stage in the service template

1 In the left pane, click **Service Template**.

2 Click **New Stage**.

3 Provide stage details:

- Name.
- Specification of whether to restrict the stage to Stage Manager and service administrators. For example, you might want to prevent development or QA users from accessing deliverables for production.
- Resource pool.

4 Click **OK**.

Editing Stage Properties for the Service Template

You can update the parameters for each stage in the service template.

To update the stage properties for the service template

1 In the left pane, click **Service Template**.

2 Move the pointer over a stage name and choose **Properties** from the menu.

3 Update the stage properties:

- Name.
- Specification of whether to restrict the stage to Stage Manager and service administrators. For example, you might want to prevent development or QA users from accessing deliverables for production.
- Resource pool.

4 Click **OK**.

Creating Services

Stage Manager administrators can use the Services page to create a new service. This process involves assigning users as service users or service administrators. For information about users and administrators, see "Reviewing User Roles" on page 25.

To create a service

1 From the left pane, click **Services**.

2 Click the **New Service** button.

3 Provide service details:

- Name
- (Optional) Description

4 From the list of available users, select the appropriate users and use the right and left arrows to assign them roles as service users or service administrators.

Although Stage Manager administrators have access to all services, you might still assign specific roles for tracking purposes. For example, you can see users identified with service administrator access on the Services page.

5 Click **OK**.

The new service appears with the default stages set in the service template.

Deleting Services

Stage Manager administrators can delete a service after deleting all the configurations in the stages of the service. See "Deleting Configurations" on page 124.

To delete a service

1 From the left pane, click **Services**.

2 Move the pointer over the service name and choose **Delete** from the menu.

3 Click **OK**.

Managing Virtual Machine Templates

Before using virtual machines in Stage Manager, Stage Manager administrators need to become familiar with templates which serve as the basis of virtual machines.

Click the **VM Templates** link in the left pane to access the template library.

On this page, a table presents this information:

- Console icons that provide access to the virtual machine console
- Template names that provides a pop-up menu to perform operations on the template
- Template status for operations such as deploy, publish, or import
- Template creator. If a creator is no longer registered in Stage Manager, **(Unavailable)** appears in the **Creator** column. For the sample template, **Default User** appears in the **Creator** column.
- VMware Tools status.

  If VMware Tools is installed on the template and the version meets Stage Manager requirements, **Installed** appears in the **VMware Tools** column.

If VMware Tools is installed on the template and the version does not meet Stage Manager requirements, **Installed (Requires Update)** appears in the **VMware Tools** column.

If Stage Manager cannot detect whether VMware Tools is installed, **Unknown** appears in the **VMware Tools** column.

For VMware Tool requirements, see "Installing VMware Tools" on page 39.

- Date and time of the last deploy operation
- Messages

Use this page to add a template or import a virtual machine as a template under Stage Manager control. See "Reviewing the Four Methods of Creating Templates" on page 35.

From the table, you can deploy, export, clone, publish, and delete a template. You can access the properties of a template.

Reviewing the Four Methods of Creating Templates

Use one of these methods to create a template:

- Install an operating system and other applications on a blank template.
- Import a virtual machine external to Stage Manager to serve as a template from a network directory.
- Use an active virtual machine under Stage Manager control as the basis of a new template.
- Clone a template already in the template library.

Installing an Operating System and Applications on a Blank Template

Installing an operating system and applications on a blank template involves these high-level tasks:

- Create a blank template without an operating system or additional software.
- Deploy the template.
- Install a guest operating system on the virtual machine.
- Install VMware Tools.
- Install any additional software you need to run on the virtual machine.

- Review guest customization information for Stage Manager and complete specific steps for Windows NT and Solaris templates.
- Shut down the guest operating system.
- Undeploy the template.
- Publish the template to make it available for building configurations.

Creating Blank Templates

Create a blank template to start the process described in "Installing an Operating System and Applications on a Blank Template" on page 35.

This process can involve specifying deployment and storage leases. See "Reviewing the Resource Cleanup Tab" on page 103.

To create a blank template

1 In the left pane, click **VM Templates**.

2 Click **Add VM Template**.

3 Provide template details:

- Name that contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods.

  Maximum length is 64 characters.

- (Optional) Description.
- Datastore.
- Guest operating system.

  This selection prepares the virtual machine for the actual installation of the guest operating system.

  If you select a 64-bit guest operating system, the datastore must be connected to an ESX Server host that provides the required 64-bit processor for that guest OS. You can proceed without fulfilling this requirement but you cannot deploy the template until you attach a host with the correct processor. If you have some but not all 64-bit hosts, Stage Manager limits the number of hosts on which the template can be deployed.

  For information about enabling a host to provide 64-bit support, see VMware Infrastructure 3 documentation.

- Number of virtual CPUs.

  The datastore for virtual machines must be connected to a host that provides the required SMP technology for the guest operating system. If you choose a CPU number not currently compatible with the CPU of the host, you cannot deploy the virtual machine until you attach a host with the appropriate SMP support. If you have some but not all hosts that provide the required SMP technology, Stage Manager limits the number of hosts on which the template can be deployed.

- Disk type.
- Disk size in gigabytes.
- Memory in megabytes.
- Time to undeploy the template.

  Stage Manager allows you to renew a lease at a later time.

- Time to delete the template or mark the template for deletion.

4 Click **OK**.

The Virtual Machine Templates page lists the new template with an **Undeployed** and **Unpublished** status.

Deploying Templates

Deploy a template to register it with a resource pool and provides access to Stage Manager operations at the virtual machine console level.

This operation involves specifying a deployment lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To deploy a template with default preferences

1 In the left pane, click **VM Templates**.

2 If the template is published (available for configuration use), move the pointer over the template name and choose **Unpublish** from the menu.

3 Move the pointer over the template name and choose **Deploy with defaults** from the menu.

Stage Manager deploys the template with deployment options from your user preferences and the virtual machine console icons for that configuration become active. See "Setting User Preferences" on page 25.

To deploy a template without default preferences

1 In the left pane, click **VM Templates**.

2 If the template is published (available for configuration use), move the pointer over the template name and choose **Unpublish** from the menu.

3 Move the pointer over the template name and choose **Deploy** from the menu.

4 Specify the deploy options:

   a Select a resource pool.

   b Deselect the **Power On After Deployment** check box to prevent Stage Manager from turning on virtual machines immediately after deployment.

      Use this option when you need to manually bring up a template.

   c Specify a time to undeploy the configuration.

5 Click **OK**.

Deploying Templates on High Availability Clusters

If you deploy a template on a cluster with VMware HA, Stage Manager uses the same calculation that VirtualCenter has for assessing free slots available in the cluster. After assessing that the hosts have enough resources, Stage Manager powers on the virtual machine template. If the hosts do not meet compatibility requirements, the deploy operation fails and Stage Manager displays a message.

If you experience a failure, you need to reconfigure the resources. For information about resource management, see the *Resource Management Guide* for VMware Infrastructure 3.

The calculation that VirtualCenter and Stage Manager uses is conservative. If necessary, disable it in VirtualCenter to stop this calculation in Stage Manager.

To disable the calculation

1 Log in to the VI Client.

2 Right-click the cluster and select **Edit Settings**.

3 In the left pane of the dialog box, select **VMware HA**.

4 In the **Admission Control** section of the dialog box, select **Allow virtual machines to be powered on even if they violate availability constraints**.

5 Click **OK**.

Installing Guest Operating Systems

Installing a guest operating system requires entering the path name of an ISO image file. For information about adding ISO files to the Stage Manager media library, see "Managing Media" on page 63.

To install a guest operating system on a template

1 In the left pane, click **VM Templates**.

A template must be deployed to install an operating system on it. See "Deploying Templates" on page 37.

2 Click the thumbnail icon in the **Console** column for the appropriate template.

3 Move the pointer over the tab with the template name and choose **Insert CD** from the menu.

4 Select an ISO file from the Stage Manager media library and click **OK**.

5 From the tab, move the pointer over the template name and choose **Reset** from the menu to start the installation.

Resetting the machine restarts the virtual machine and clears the machine state. This operation does not shut down the guest operating system.

6 In the virtual machine console of the template, enter any required information for the installation process.

The installation of the operating system resembles the installation on a physical machine and takes a similar amount of time.

Installing VMware Tools

Install the VMware Tools utility in the guest operating system. This utility supports shared folders and cut and paste operations between the guest operating system and the machine from which you launch the Stage Manager Web console. VMware Tools improves mouse performance in some guest operating systems and graphic performance. Stage Manager depends on the VMware Tools utility for customizing the guest operating system.

Installing VMware Tools allows you to move the pointer in to and out of the virtual machine console window. Prior to installing VMware Tools, you can "lose the mouse" when navigating into and out of the console window. Press Ctrl+Alt to fix the problem.

To install VMware Tools

1 In the left pane, click **VM Templates**.

A template must be deployed to install VMware Tools. See "Deploying Templates" on page 37.

2 Move the pointer over the template name and choose **View Console** from the menu.

3 Log in to the guest operating system inside the virtual machine console.

4 Click **Install VMware Tools**.

Installing VMware Tools takes several minutes and requires you to restart the virtual machine. For more information about the installation, see VMware Infrastructure 3 documentation.

Customizing Guest Operating Systems

For virtual machines created from templates, Stage Manager can customize the network settings inside the guest operating system. These settings include the machine name, IP settings, and Security Identifier (SID) for Windows guest operating systems. This customization allows you to create unique virtual machines from templates without manual requirements.

Stage Manager can assign IP addresses from an IP address pool. See "Configuring Network Settings" on page 90.

When you configure a template with the prerequisites for guest customization and add a virtual machine to a configuration based on that template, Stage Manager creates a package with guest customization tools. Deploying and powering on that virtual machine for the first time causes Stage Manager to copy the package, run the tools, and delete the package from the virtual machine. This automatic process takes a few minutes.

Without guest customization, the virtual machine uses the settings of the template it is based on. This situation can create machine name and network conflicts when you deploy more than one virtual machine created from the same template at the same time. To avoid these conflicts without guest customization, access the virtual machine console through Stage Manager and manually set its network parameters to unique values. If you have a Windows virtual machine, change the Security Identifier (SID) using Microsoft Sysprep or another third-party tool.

Prerequisites for Guest Customization

Review these prerequisites:

- You must specify the correct guest operating system from the Template Properties page. Stage Manager uses this information to determine how to customize the operating system.
- You must install the version of VMware Tools packaged with ESX Server 3.5 or higher. The Stage Manager Web console also provides the correct version for installation.

  If you create a template in Stage Manager and install VMware Tools in Stage Manager, the template will have the correct VMware Tools version.

  If you import a virtual machine as a template to Stage Manager, you must deploy the template. The deploy operation allows Stage Manager to detect the version of VMware Tools installed on the template. (Information about the version or installation status appears in the advanced properties of the template and the Virtual Machine Templates page. See "Managing Virtual Machine Templates" on page 34.) If the template has an outdated version of VMware Tools (bundled with VMware Infrastructure prior to ESX Server 3.5), or the template never had VMware Tools installed on it, you must install VMware Tools in Stage Manager.

  If you import a template that was originally used in VMware Lab Manager version 2.x, see "Importing Templates from Lab Manager 2.x with VMware Tools and LM Tools" on page 46.
- The template cannot be part of a domain.
- The template cannot be configured as a Microsoft Cluster Service server, a Microsoft Certificate Services server, or a domain controller.
- For the following Windows guest operating systems, Stage Manager administrators must set up a Microsoft Sysprep package:
  - Microsoft Windows XP 64-bit
  - Microsoft Windows 2003 64-bit

  Microsoft Windows NT Server 4 and Solaris templates require additional steps. See "Completing Guest Customization for Windows NT and Solaris Templates" on page 45.

Building a Microsoft Sysprep Package for Guest Customization

Stage Manager can customize the network settings, such as the Windows SID, inside the guest operating system of a virtual machine based on a template. SIDgen is a tool packaged with Stage Manager to change the SID for most virtual machines running Windows 32-bit guest operating systems. Under some circumstances, you need or can choose to replace SIDgen with Microsoft Sysprep. Microsoft Sysprep is included on the installation CDs for Windows 2000, Windows 2003, and Windows XP.

Do not build a Microsoft Sysprep package for the Windows Vista and Windows 2008 operating systems. Stage Manager automatically uses Microsoft Sysprep instead of SIDgen because it is already built in these operating systems.

You must build a Microsoft Sysprep package for Windows 64-bit operating systems. These operating systems cannot use SIDgen.

For information about guest operating support for SIDgen and Microsoft Sysprep, see Appendix B, "Guest Operating System Support," on page 177.

CAUTION Stage Manager provides a customized `sysprep.inf` file. During the procedure to build a Microsoft Sysprep package, do not overwrite this file with the `sysprep.inf` file from the Windows CD.

To build a Microsoft Sysprep package for guest customization

1. For each operating system (Windows 2000, Windows XP, Windows 2003, or a 64-bit Windows operating system), insert the Windows OS CD in the CD-ROM of the Stage Manager Server system.

   If you have an ISO, mount the ISO using a third-party tool.

2. Locate the `DEPLOY.CAB` file in the `\Support\Tools` directory on the CD.

3. Expand the `DEPLOY.CAB` file using `Winzip.exe` or another tool capable of reading Microsoft CAB files.

   You can also use Windows Explorer in Windows XP or Windows 2003.

4. Copy the files to the appropriate Stage Manager directory for Microsoft Sysprep support.

   For example, if you installed Stage Manager in `C:\Program Files\VMware\VMware Stage Manager Server`, copy the files to one of these directories:

   - `C:\Program Files\VMware\VMware Stage Manager Server\Tools\CustomizeGuest\Windows\Sysprep\win2k3`

- `C:\Program Files\VMware\VMware Stage Manager Server\Tools\CustomizeGuest\Windows\Sysprep\win2k3_64`

  This location is for 64-bit Windows 2003.

- `C:\Program Files\VMware\VMware Stage Manager Server\Tools\CustomizeGuest\Windows\Sysprep\win2000`
- `C:\Program Files\VMware\VMware Stage Manager Server\Tools\CustomizeGuest\Windows\Sysprep\winxp`
- `C:\Program Files\VMware\VMware Stage Manager Server\Tools\CustomizeGuest\Windows\Sysprep\winxp_64`

  This location is for 64-bit Windows XP.

5 Repeat Step 1 through Step 4 to extract Microsoft Sysprep files for each Windows guest operating system.

6 In the Stage Manager Web console, click **Settings** in the left pane.

7 In the **Guest Customization** tab, click the **Build Package** button.

When complete, the **Guest Customization** tab indicates a package exists.

8 Select a SID mechanism, SIDgen or Microsoft Sysprep.

This selection determines the default mechanism of new templates that work with either SIDgen or Microsoft Sysprep (Windows 2000, Windows 2003 32-bit, and Windows XP 32-bit). If you are not ready to use Microsoft Sysprep because of testing activity or another situation, select the **Use Pre-Installed SID Generation Tool (SIDgen)** radio button.

To change the SID mechanism for a particular template, edit the advanced properties of that template and switch the mechanism.

9 Click **OK**.

Disabling Guest Customization

By default, Stage Manager activates guest customization when you create a new template or import a template. You can disable guest customization in the advanced properties of unpublished templates. (See "Editing Basic Template Properties" on page 55.) This disabled setting is stored when you export the template to SMB storage and import it back to Stage Manager.

If you create a template based on an active virtual machine in a configuration, the template retains the customization setting of the active virtual machine.

Consider disabling guest customization under these special circumstances:

- The software in the template is configured to use specific network settings.
- You have virtual machines that must remain untouched for specific security or integrity requirements.
- You are using unsupported guest operating systems outside the scope of those listed in Appendix B, "Guest Operating System Support," on page 177.

To disable guest customization

1 In the left pane, click **VM Templates**.

2 Move the pointer over the template name and choose **Properties** from the menu.

The template must be unpublished to disable the guest customization property. See "Unpublishing Templates" on page 60.

3 Click the **Advanced Properties** button.

4 In the **Virtual Machine Tools** section, deselect the **Perform Customization When Adding to Configuration** check box.

5 Click **OK**.

Disabling the Check of VMware Tools Prior to Publishing Templates

You might need to bypass the requirement for VMware Tools version 7299 or higher (bundled with ESX Server 3.5) for publishing templates in these circumstances:

- You cannot install the required VMware Tools version because you must have special scripts in the template for customization.
- You import templates that happen to have the LM Tools utility from VMware Lab Manager, a separate product, and you cannot upgrade the VMware Tools utility on those templates.

  In this case, Stage Manager recognizes the LM Tools utility and can customize the guest according to the needs of that utility.
- You are using unsupported guest operating systems outside the scope of those listed in Appendix B, "Guest Operating System Support," on page 177.

To disable the check of VMware Tools

1 In the left pane, click **Settings**.

2 In the **Guest Customization** tab, deselect the **Only Allow Publishing of Templates With a Version of VMware Tools That Supports Guest Customization** check box.

3 Click **OK**.

Completing Guest Customization for Windows NT and Solaris Templates

Windows NT and Solaris templates require extra steps for guest customization.

To complete guest customization for Windows NT templates

1 In the left pane of the console, click **VM Templates**.

A template must be deployed to install an operating system on it. See "Deploying Templates" on page 37.

2 Move the pointer over the template name and choose **View Console** from the menu.

3 Move the pointer over the template name and choose **Insert Customization CD** from the menu.

This option starts a script that copies files to the guest and makes the template ready for customization.

To complete guest customization for Solaris templates

1 In the left pane of the console, click **VM Templates**.

A template must be deployed to install an operating system on it. See "Deploying Templates" on page 37.

2 Move the pointer over the template name and choose **View Console** from the menu.

3 Move the pointer over the template name and choose **Insert Customization CD** from the menu.

4 Log in to the Solaris guest operating system.

5 In the virtual machine console, enter these case-sensitive commands:

```
> /etc/init.d/volmgt stop
> /etc/init.d/volmgt start
> cp –p /cdrom/cdrom/customvm. /etc/init.d/customvm
> sh /etc/init.d/customvm install
> eject cdrom
```

6 Leave the virtual machine console.

7 Shut down the virtual machine from inside the guest operating system.

See "Shutting Down Templates" on page 46.

Importing Templates from Lab Manager 2.x with VMware Tools and LM Tools

If you import templates that once resided in Lab Manager, the templates are likely to have an older version of VMware Tools and the VMware Tools enforcement check in Stage Manager prevents you from publishing the template. Review these options:

- You can upgrade VMware Tools to the version available for installation in Stage Manager. This allows guest customization and publishing to occur.
- If the template has the Lab Manager LM Tools utility, you can disable the VMware Tools enforcement check (see "Disabling the Check of VMware Tools Prior to Publishing Templates" on page 44). This allows Stage Manager to customize guests according to the method used in Lab Manager. VMware does not recommend this approach.
- If the template does not have the LM Tools utility and you do not upgrade VMware Tools, disable the **Perform Customization** setting on the advanced properties of templates. See "Disabling Guest Customization" on page 43.

Shutting Down Templates

Shut down the guest operating system of the template before undeploying the template.

To shut down a Windows guest operating system

Navigate to the virtual machine console and choose **Start** > **Shut Down**.

To shut down a Linux guest operating system

For Linux guest operating systems, navigate to the virtual machine console and run this command:

```
> shutdown –h now
```

To shut down a Solaris guest operating system

For Solaris guest operating systems, navigate to the virtual machine console and run this command:

```
> shutdown -y -g0 -i5
```

Undeploying Templates

You can undeploy a template to unregister the virtual machine from VirtualCenter. Undeploy a template before such operations as publishing, exporting, consolidating, cloning, and deleting a template.

You can undeploy a virtual machine and save its state or undeploy a virtual machine and discard the state. For templates that are powered off, these options to save or discard state are not available because a state does not exist. Saving memory state helps you to debug memory-specific issues.

If an ESX Server host goes offline or someone manually removes a virtual machine from VirtualCenter inventory, the standard undeploy operation does not work. See "Undeploying Templates with Force" on page 109.

To undeploy a template

1 From the left pane, click **VM Templates**.

2 If the template is deployed, move the pointer over the template name and choose **Undeploy**, **Undeploy - Save State**, or **Undeploy - Discard State** from the menu.

Publishing Templates

Publishing a template makes it available for use in building multimachine configurations without reinstalling software or performing setup tasks again. The use of templates ensures that virtual machines are consistently configured with operating systems, versions, system packs, and more across an entire organization.

NOTE Storage leases are not applicable to published templates. Once a template changes from a published to unpublished state, the storage lease begins. See "Reviewing the Resource Cleanup Tab" on page 103.

To publish a template

1 From the left pane, click **VM Templates**.

A template must be undeployed to publish it. See "Undeploying Templates" on page 47.

2 Move the pointer over the template name and choose **Publish** from the menu.

Importing Virtual Machines as Templates

Importing a template implies copying a virtual machine external to the Stage Manager system into the template library. You can import an existing virtual machine from SMB or VirtualCenter storage to serve as a template.

You can import a virtual machine that is new to Stage Manager or was previously exported by Stage Manager. Stage Manager changes the MAC address of all imported virtual machines except for those in suspended states.

The setup for the virtual machine is primarily stored in these files:

- Virtual machine disk (`.vmdk`) file. You can have multiple `.vmdk` files.
- Virtual machine configuration (`.vmx` for VMware) file. This file is approximately 15K.

Stage Manager supports these types of virtual machines for import operations:

- VMware Workstation
- VMware Server
- VMware ESX Server

To import VMware Workstation or VMware Server virtual machines, first bring them under VirtualCenter control and then import them to Stage Manager. For information about ESX Server and VirtualCenter operations, see VMware Infrastructure 3 documentation.

Stage Manager does not support templates with multiple NICs or IDE disk drives. If you are not sure whether your virtual machines can run in an ESX Server environment, see VMware Converter documentation about converting virtual machine formats.

Export and import operations require an open SMB port on the ESX Server hosts. Although the installation of Stage Manager takes care of opening that port, be aware of this requirement in case someone closes the port after the installation. To check the port status, use the `esxcfg-firewall -q smbClient` command on each host.

Importing a Template from an SMB Share

You can import virtual machines as templates from an SMB share. Do not import templates manually with ESX Server commands.

This operation involves specifying deployment and storage leases. See "Reviewing the Resource Cleanup Tab" on page 103.

After importing a template, you must deploy the template to allow Stage Manager to assess the VMware Tools information and display it in the Virtual Machine Templates page. If **Unknown** or **Installed (Requires Update)** appears in the Virtual Machine Templates page, install VMware Tools. Stage Manager is dependent on VMware Tools for guest customization. See "Deploying Templates" on page 37 and "Installing VMware Tools" on page 39.

To import a template from SMB storage

1 In the left pane, click **VM Templates**.

2 Click the **Import from SMB** button.

3 Provide template details:

- Universal Naming Convention (UNC) path to the appropriate SMB share (relative to the Stage Manager Server system). A sample path is `\\10.10.10.10\importdir`. Use English characters for the UNC path.

  Stage Manager does not support SMB shares that include the $ symbol in the UNC path.

- User name and password to access the files, if necessary.
- Name.
- (Optional) Description.
- Time to undeploy the template.

  Stage Manager allows you to renew a lease at a later time.

- Time to delete the template or mark the template for deletion.

4 Click **Next**.

5 Select a datastore and click **Import**.

The Virtual Machine Templates page displays the imported template. The import process takes several minutes.

Importing a Template from VirtualCenter

If you have an existing virtual machine in a resource pool managed by VirtualCenter, only Stage Manager administrators can use the **Import from VirtualCenter** button to copy that virtual machine as a template under Stage Manager control.

NOTE If a virtual machine has VirtualCenter snapshot files, Stage Manager only imports the original virtual machine as a template and discards any VirtualCenter snapshot files.

This operation involves specifying a storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

After importing a template, you must deploy the template to allow Stage Manager to assess the VMware Tools information and display it in the Virtual Machine Templates page. If **Unknown** or **Installed (Requires Update)** appears in the Virtual Machine Templates page, install VMware Tools. Stage Manager is dependent on VMware Tools for guest customization. See "Deploying Templates" on page 37 and "Installing VMware Tools" on page 39.

To import a template from VirtualCenter storage

1 In the left pane, click **VM Templates**.

2 Click the **Import from VirtualCenter** button.

3 Enter the information for the template:

   a Select the virtual machine in the VirtualCenter directories.

   Blue icons indicate available virtual machines. You can only select virtual machines that are powered off and not already under Stage Manager control.

   b Enter a name.

   The name must contain alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. The maximum length is 64 characters.

   c (Optional) Enter a description.

   d Specify a time to delete the template or mark the template for deletion.

   e Select a datastore and click **OK**.

Creating Templates from Active Virtual Machines in Stage Manager

You can create a template from an active virtual machine in Stage Manager. After a virtual machine in a configuration undergoes changes, such as the addition of software or altered properties, you might want to use it as the basis of a new template. The new template is a linked clone of the original virtual machine.

This operation involves specifying deployment and storage leases. See "Reviewing the Resource Cleanup Tab" on page 103.

After creating a template from an active virtual machine, you must verify the version of VMware Tools on the template. Information on VMware Tools appears in the Virtual Machine Templates page.

- If the version is **Unknown**, deploying the template allows Stage Manager to assess the version and display information on the page. See "Deploying Templates" on page 37.
- If the version appears as **Installed (Requires Update)**, you must install VMware Tools. Stage Manager is dependent on VMware Tools for guest customization. See "Installing VMware Tools" on page 39.

To create a template from an active virtual machine

1. In the left pane, click **Services**.
2. Move the pointer over the service name and choose **Details** from the menu.
3. Move the pointer over the configuration name and choose **Details** from the menu.
4. In the **Virtual Machines** tab, move the pointer over the virtual machine name and choose **Add to VM Templates** from the menu.
5. Provide template details:
   - Name that contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 64 characters.
   - (Optional) Description.
   - Time to undeploy the template.
   - Time to delete the template or mark the template for deletion.
6. Click **OK**.

Cloning Existing Templates

You can create a linked clone or a full clone of a template to take advantage of software already installed on that template.

A linked-clone operation generates a "quick" copy by creating a delta disk instead of copying an entire virtual hard disk. This operation addresses virtual machine proliferation by using "referential provisioning," a process that involves storing new changes but referring back to a chain of delta disks. For each clone, Stage Manager freezes the original delta disk and creates a new one.

A full-clone operation copies all of the delta disks and the master disk. The original template continues to exist. Unlike linked cloning, full cloning creates a new template that is a consolidated version of the original with no dependencies on a base disk. The new template becomes its own base disk.

Typically, you do not create full clones except under these conditions:

- To dismantle the storage and move the template to a different server
- To maximize performance for virtual machines (for example, for certain production-level virtual machines)

A full-clone operation takes a longer time than a linked-clone operation.

Linked-clone and full-clone operations involve specifying deployment and storage leases. See "Reviewing the Resource Cleanup Tab" on page 103.

After cloning a template, you must verify the version of VMware Tools on the template. Information on VMware Tools appears in the Virtual Machine Templates page.

- If the version is **Unknown**, deploying the template allows Stage Manager to assess the version and display information on the page. See "Deploying Templates" on page 37.
- If the version appears as **Installed (Requires Update)**, you must install VMware Tools. Stage Manager is dependent on VMware Tools for guest customization. See "Installing VMware Tools" on page 39.

To make a linked clone of a template

1. In the left pane, click **VM Templates**.
2. Move the pointer over the template name, and choose **Make Linked Clone** from the menu.

3 Provide template details:

- Name
- (Optional) Description
- Time to undeploy the template
- Time to delete the template or mark the template for deletion

4 Click **OK**.

The new template appears on the Virtual Machine Templates page.

To make a full clone of a template

1 In the left pane, click **VM Templates**.

2 Move the pointer over the template name, and choose **Make Full Clone** from the menu.

3 Provide template details:

- Name
- (Optional) Description
- Destination datastore
- Time to undeploy the template
- Time to delete the template or mark the template for deletion

4 Click **OK**.

The new template appears on the Virtual Machine Templates page.

Updating Templates

To change an existing template with an update, such as a patch or service pack, complete these tasks:

- Unpublish the template.
- Deploy the template.
- Install the necessary updates.
- Shut down the virtual machine after completing all the necessary updates.
- Undeploy the template.
- Publish the template.

Exporting Templates

You can export (copy) a template to an SMB share. This operation assumes that you enabled a shared folder with full control permissions at the share and file system level. Exporting can take up an extended period of time, depending on the size of the virtual machine.

Export and import operations require an open SMB port on the ESX Server hosts. Although the installation of Stage Manager takes care of opening that port, be aware of this requirement in case someone closes the port after the installation. To check the port status, use the `esxcfg-firewall -q smbClient` command on each host.

To export a template

1 In the left pane, click **VM Templates**.

The template must be undeployed to export it. See "Undeploying Templates" on page 47.

2 Move the pointer over the template name and choose **Export** from the menu.

3 Provide the location and user credentials:

- UNC path of the SMB share (relative to the Stage Manager Server system) where you want to store the files. A sample path is `\\10.10.10.10\ExportTemplates`. Use English characters for the UNC path.
- User name and password to access the files, if necessary.

4 Click **OK**.

Consolidating Templates

Each time you create a linked clone of a template, Stage Manager freezes the virtual hard disk associated with the original template and creates delta disks to store future changes to the clone and its source. Over time, the increasing number of delta disks stored across the directories of a datastore can affect performance. You do not need to consolidate templates until Stage Manager generates an error requesting this operation.

NOTE Even if you do not have to consolidate disks, you can use this operation to move a template to a different datastore.

Consolidating a template only occurs on unpublished templates and can take an extended period of time, depending on the disk size and storage performance. Consolidation reduces the free space on datastores because the template no longer benefits from delta disks.

To consolidate a template

1 In the left pane, click **VM Templates**.

The template must be undeployed and unpublished. See "Undeploying Templates" on page 47 and "Unpublishing Templates" on page 60.

2 Move the pointer over the template name and choose **Consolidate** from the menu.

3 Select a datastore and click **OK**.

Editing Basic Template Properties

You can update the basic properties of a template. To update properties from the **Resources** area of the Stage Manager Web console, see "Editing Template and Virtual Machine Properties After Assessing Datastore Usage" on page 88.

This operation involves specifying deployment or storage leases. See "Reviewing the Resource Cleanup Tab" on page 103.

For information about CPU priority, memory priority, and enabling a host to provide 64-bit support, see VMware Infrastructure 3 documentation.

To edit basic template properties

1 In the left pane, click **VM Templates**.

2 Move the pointer over the template name and choose **Properties** from the menu.

3 Review and edit the appropriate properties:

- **Name** – Name that contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 64 characters.
- **Description** – (Optional) Maximum number of characters is 128.
- **Datastore** – Storage location of the template.

- **Guest OS** – Guest operating system of the template.

  If you select a 64-bit guest operating system, the datastore must be connected to an ESX Server host that provides the required 64-bit processor for that guest OS. You can proceed without fulfilling this requirement but you cannot deploy the template until you attach a host with the correct processor. If you have some but not all 64-bit hosts, Stage Manager limits the number of hosts on which the template can be deployed.

- **Number of Virtual CPUs** – Maximum number of processors is four.

  The datastore for a template must be connected to a host that provides the required SMP technology for the guest operating system. If you choose a CPU number not currently compatible with the CPU of the host, you cannot deploy the template until you attach a host with the appropriate SMP support. If you have some but not all hosts that provide the required SMP technology, Stage Manager limits the number of hosts on which the template can be deployed.

- **Memory** – Amount of RAM allocated for running the template.

- **Hard Disks** – Name of the disk, disk space, and bus type for each virtual hard disk.

  You can add, edit or remove a virtual hard disk. See "Adding Virtual Hard Disks to Templates" on page 59 and "Editing Hard Disks" on page 60.

- **CPU Priority** – Priority for shares of CPU.

- **Memory Priority** – Priority for shares of memory.

- **Deployment Lease** or **Storage Lease** – Time to undeploy or delete the template (or mark it for deletion), depending on whether the template is deployed or not.

- **System Messages** – Information about the virtual machine.

4 Click **OK**.

Editing Advanced Template Properties

You can update advanced settings such as CPU and memory parameters and view information on VMware Tools and guest customization. For information about supported versions of VMware Tools, see "Prerequisites for Guest Customization" on page 41. For information about CPU and memory settings, see VMware Infrastructure 3 documentation.

To edit advanced template properties

1 In the left pane, click **VM Templates**.

2 Move the pointer over the template name and choose **Properties** from the menu.

3 Click **Advanced Properties**.

4 Update the CPU settings:

- **CPU Priority**– Priority for shares of CPU.
- **CPU Reservation** – Minimum amount of CPU set aside for the template.
- **CPU Limit** – Maximum amount of CPU available for the template.
- **Use 32-bit Virtual CPU (Override the Host CPU Type)** – By default, the virtual CPU type assumes the physical host CPU type.

  Select this check box to override the default behavior and ensure the virtual CPU type is 32-bit. For example, you might have a template with a 32-bit guest operating system that does not have the requires software (kernel or drivers) to run on a 64-bit processor. Another example involves a mixed (32-bit and 64-bit) ESX host environment where you need to complete a testing process specifically on a 32-bit guest operating system and that operating system accommodates both 32-bit and 64-bit CPU architecture.

5 Update the memory settings:

- **Memory Priority** – Priority for shares of memory.
- **Memory Reservation** – Minimum amount of memory set aside for the template.
- **Memory Limit** – Maximum amount of memory available for the template.

6 View or update the virtual machine tool and customization settings:

- **VMware Tools Installed** – Status of whether VMware Tools is installed or not.

  If **Unknown (Must deploy to determine)** appears, deploy the virtual machine and check this value again.

- **VMware Tools Internal Version** – Version of VMware Tools installed on the template.

  If VMware Tools is not installed, **Not Applicable** appears.

  For VMware Support cases, a VMware representative might request this version.

- **Supports Customization** – Specification of whether the installed version of VMware Tools supports guest customization in Stage Manager.

  If the value of the VMware Tools Internal Version field is less than 7299, you cannot make use of guest customization unless you install a supported version of VMware Tools.

- **Perform Customization When Adding to Configuration** – Specification of whether guest customization is disabled. Deselect this check box to disable guest customization. See "Disabling Guest Customization" on page 43.

  You can edit this setting when the template is unpublished.

- **SID Mechanism** – Specification of the tool Stage Manager uses to change the SID. If the template is unpublished, you can switch the default tool Stage Manager uses to change the SID.

  This entry appears only if the guest operating system supports both Microsoft Sysprep and SIDgen, and the Stage Manager administrator created a package with Microsoft Sysprep for guest customization. See "Building a Microsoft Sysprep Package for Guest Customization" on page 42.

- **Use Time Synchronization** – Check box that enables time synchronization between the guest (virtual machine) and ESX Server host operating systems. You must install VMware Tools to use this property.

  This property sets the value of `tools.syncTime` in the `.vmx` file.

7 View the remaining virtual machine settings:

- **VM Chain Length** – Number of delta disks generated by certain operations. For each change, Stage Manager freezes the original delta disk and creates a new one. Stage Manager generates an error to notify you when you need to consolidate the chain.

- **VM Directory ID** – Location of the virtual machine template on the file system.

- **MAC Address** – Machine Media Access Control (MAC) address. If the template is undeployed, you can click the **Reset MAC Address** button to change the MAC address. See "Changing MAC Addresses" on page 59.

8 Click **OK**.

Changing MAC Addresses

You can change a MAC address for an undeployed template.

You might change a MAC address if you have a MAC conflict or if you need to discard saved state quickly and easily.

To change the MAC address for a template

1 In the left pane, click **VM Templates**.

2 Move the pointer over the template name and choose **Properties** from the menu.

3 Click **Advanced Properties**.

4 Create a random MAC address:

   a Click **Reset MAC Address**.

   You cannot specify your own MAC address.

   b Click **OK**.

Adding Virtual Hard Disks to Templates

You can add one or more virtual hard disks (`.vhd`) for an undeployed template.

To add virtual hard disks

1 In the left pane, click **VM Templates**.

2 Move the pointer over the template name and choose **Properties** from the menu.

3 Click the **Add Hard Disk** button.

4 Enter the disk information:

   a Specify whether the bus type is BusLogic SCSI or LSI Logic SCSI.

   b Review these details on the bus number, bus ID, and disk size:

   - If bus numbers are not available, **None** appears in the **Bus Number** list.
   - Bus ID #7 is reserved for a SCSI adapter.
   - If a bus is completely used, the **Bus ID** list appears as an empty list.
   - Disk size is limited by the space available for datastores.

5 Click **OK**.

   The new hard disk appears in the information on properties.

Adding SCSI Virtual Hard Disks

If you add a SCSI hard disk to a virtual machine, you might generate an operating system error message about missing drivers for this device. If this error occurs, download and install the appropriate driver, and contact VMware for further support.

Editing Hard Disks

You can update the bus number and bus ID of a hard disk. See "Editing Basic Template Properties" on page 55. Review this information:

- If bus numbers are not available, **None** appears in the Bus Number list.
- Bus ID #7 is reserved for a SCSI adapter.
- If a bus is completely used, the Bus ID list appears as an empty list.

To make these changes instead in VirtualCenter, see VMware Infrastructure 3 documentation.

Unpublishing Templates

Unpublish a template to make it unavailable for configuration use.

To unpublish a template

1 In the left pane, click **VM Templates**.

2 Move the pointer over the published template name and choose **Unpublish** from the menu.

Deleting Templates

If the template is undeployed but published, unpublish a template before deleting it. An exception might come up if you are unable to unpublish a template. See "Deleting Published Templates With Force After Host Failure" on page 111.

To delete a template

1 In the left pane, click **VM Templates**.

A template must be undeployed and unpublished to delete it. See "Undeploying Templates" on page 47 and "Unpublishing Templates" on page 60.

2 Move the pointer over the template name and choose **Delete** from the menu.

Accessing Virtual Machine Consoles of Templates

From a template console, you can perform operations ranging from installation of VMware Tools to media file activity for the guest operating system to snapshots of virtual machines. See "Performing Virtual Machine Operations" on page 144.

If you take a snapshot, a revert point displays a thumbnail icon of the last snapshot point in the upper-right corner of the page.

To access the virtual machine console of a template

1 In the left pane, click **VM Templates**.

2 Move the pointer over the name of a deployed template, and choose **View Console** from the menu.

Importing Virtual Machines from VirtualCenter to New and Existing Configurations

When you add a virtual machine to a configuration, only Stage Manager administrators have the option to import (copy) a virtual machine from VirtualCenter. For more instructions on adding virtual machines to a new configuration, see "Creating Configurations" on page 121.

NOTE If a virtual machine has VirtualCenter snapshot files, Stage Manager only imports the original virtual machine and discards any VirtualCenter snapshot files.

To import a virtual machine from VirtualCenter for a new configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Click **New Configuration**.

4 Enter a name for the configuration.

5 (Optional) Enter a description of the configuration.

6 (Optional for DHCP IP address allocation) Change the networking information for the gateway, subnet mask, and DNS settings for the virtual machines.

The default networking values are the same values in the **General** tab of the Network page.

7 Specify a time to delete the configuration or mark the configuration for deletion.

8 Select a stage.

9 Click the **Import VM from VirtualCenter** button.

10 Complete the details for the import operation:

a Select a virtual machine from the VirtualCenter inventory.

Virtual machines have a light blue icon. You can only select virtual machines that are powered off and not already under Stage Manager control.

b Enter a name for the virtual machine for use in Stage Manager.

The name must contain alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 64 characters.

c Specify whether to use static or DHCP IP address assignment.

d If you specify static IP address allocation, enter an IP address.

e Select the datastore for the virtual machine and click **OK**.

11 To add another virtual machine to this configuration, click the **Import VM from VirtualCenter** button again.

12 In the New Configuration page, click **OK**.

To import a virtual machine from VirtualCenter for an existing configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

If you want to access details on an archived configuration instead of an active lifecycle configuration, click the **Archive** tab.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Click the **Import VM from VirtualCenter** button.

If a virtual machine has VirtualCenter snapshot files, Stage Manager only imports the original virtual machine and discards any VirtualCenter snapshot files.

5 Complete the details for the import operation:

a Select a virtual machine from the VirtualCenter inventory.

Virtual machines have a light blue icon. You can only select virtual machines that are powered off and not already under Stage Manager control.

b Enter a name for the virtual machine for use in Stage Manager.

The name must contain alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 64 characters.

c Specify whether to use static or DHCP IP address assignment.

d If you specify static IP address allocation, enter an IP address.

e Select the datastore for the virtual machine and click **OK**.

Managing Media

The media library enables you to store media image files. You can upload data (for example, drivers) to a template from the media library.

During the Insert CD or Insert Floppy operations available from the individual console of a template or virtual machine, you can access the ISOs in the media library.

Use the **Media** link in the left pane to work with CD, DVD, and floppy image files. On this page, a table includes this information about these files:

- Name and media store (in parentheses)
- Type
- Location

NOTE If you cannot see media files that reside on an NFS datastore, make sure the directory containing the media (known as a media store) is enabled. See "Enabling Resources" on page 77.

Use this page to synchronize the contents of the media library with the contents of your NFS media storage. From the table, you can access the properties of a media file. Stage Manager administrators can access all files.

Synchronizing the Media Library with Files in a Media Store

You can synchronize the contents of the Stage Manager media library with the latest contents of NFS media stores (directories for media on NFS datastores) so that you can add or delete files in the library.

The ability to synchronize the library enables users to perform ISO operations outside of the Stage Manager Web console.

Review these file requirements:

- CD and DVD files must end with `.iso`.
- Floppy files must end with `.img`, `.vfd`, or `.flp`.

Make sure the media store containing the appropriate files is enabled. See "Enabling Resources" on page 77. For information about media stores, see "Highlights of the Media Store Tab" on page 72.

To synchronize media from the media library

1 In the left pane, click **Media**.

2 Click the **Synchronize Media** button.

To synchronize media from an NFS media store

1 Click **Resources** in the left pane.

2 In the **Media Stores** tab, move the pointer over the media store name and choose **Synchronize** from the menu.

Editing Media Properties

You can add comments for a media file in the properties information.

To edit media properties

1 In the left pane, click **Media**.

2 Move the pointer over a media file name and choose **Properties** from the menu.

3 (Optional) Enter comments on the file for display on the Media page.

4 Click **OK**.

Managing Users

Managing users involves operations such as adding and deleting users and editing user properties.

All users in Stage Manager can set their own user preferences. See "Setting User Preferences" on page 25.

Viewing Users and Sending Group Email

Stage Manager administrators can view all users.

Use the **Users** link in the left pane to access user management operations in the **Users** tab and **Notification** tab.

The **Users** tab presents this information:

- Name

  A gray icon indicates the user is disabled and cannot log in to the Web console. A blue and yellow icon indicates the user is enabled.

  A user can exist in the system without an enabled status. For example, you can disable a user on extended leave.

- Full name

- Role

  Administrator appears for users with Stage Manager administrator privileges. Service administrators appear as regular users. You can verify service administrators in the properties page of a service. See "Editing Service Properties" on page 116.

  Only Stage Manager administrators can perform most of the operations covered in this chapter.

- Service to which the user is assigned as a service administrator.

  You might assign Stage Manager administrators to specific service administrator roles for tracking purposes when setting up a service.

- Service to which the user is assigned as a service user.

  You might assign Stage Manager administrators to specific service user roles for tracking purposes when setting up a service.

Use this page to add a user to the Stage Manager environment. From the table, you can delete and disable users and access user properties.

The **Notification** tab allows you to send email messages to four different groups:

- All Users
- Administrators
- Non-Administrators
- Users With Deployed VM(s)

For example, use the Users With Deployed VM(s) group when you are running low on resources and want users to undeploy inactive virtual machines.

Sending email notification is dependent on SMTP settings in the Stage Manager Web console.

To send email notification to a group of users

1 Select a user group.

2 Enter the content of the email.

3 Click **Send**.

To verify SMTP settings

1 In the left pane, click **Settings**.

2 Verify the information in the **Email Preferences** section.

3 Click **Test SMTP Settings** to verify the server connection works.

Adding New Users

Stage Manager administrators can add new users.

This operation involves assigning user roles and selecting fencing modes. See "Reviewing User Roles" on page 25 and Appendix C, "Network Fencing," on page 181.

To add a new user

1 In the left pane, click **Users**.

2 Click **Add User**.

3 Enter user information:

- Name for use in the Web console
- Password

  The password requires at least six characters.
- Full name
- Email address
- (Optional) Instant messaging and phone details

4 To assign Stage Manager administrator privileges, select the **Is Administrator** check box.

5 To block the user from immediate access to the Web console, deselect the **Is Enabled** check box.

  Although user information remains stored in the system, you can enable and disable access.

6 Specify whether to use a network architecture mode for deploying configurations:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.
- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

7 To boot virtual machines in the sequence specified during the creation of the configuration, select the **Use Server Boot Sequence** check box.

8 Enter the default value for the delay time (or "pause") between booting each virtual machine in a configuration.

Stage Manager uses this default value when the user creates a new configuration or adds a virtual machine to an existing configuration.

9 From the list of available services, select the appropriate services and use the right and left arrows to move them to the list for service user access or service administrators access.

Although Stage Manager administrators have access to all services, you might still assign specific roles for tracking purposes. For example, you can see this information on the Users page.

10 Click **OK**.

The new user appears on the Users page.

Deleting Users

This operation requires you to disable the user you want to delete.

To delete a user

1 In the left pane, click **Users**.

2 If the user is enabled, move the pointer over the user name and choose **Disable** from the menu.

3 Move the pointer over the user name and choose **Delete** from the menu.

Editing User Properties

Editing user properties involves assigning user roles. See "Reviewing User Roles" on page 25.

To edit user properties

1 In the left pane, click **Users**.

2 Move the pointer over the user name and choose **Properties** from the menu.

3 Update user information:

- Password

  The password requires at least six characters.

- Full name
- Email address
- (Optional) Instant messaging and phone details

4 To assign Stage Manager administrator privileges, select the **Is Administrator** check box.

5 To block the user from immediate access to the Web console, deselect the **Is Enabled** check box.

Although user information remains stored in the system, you can enable and disable access.

6 To use LDAP to verify users, select the **Is LDAP** check box (if activated).

For information about LDAP, see "Microsoft Active Directory and Stage Manager" on page 98.

7 From the list of available services, select the appropriate services and use the right and left arrows to move them to the list for service user access or service administrators access.

Although Stage Manager administrators have access to all services, you might still assign specific roles for tracking purposes. For example, you can see this information on the Users page.

8 Click **OK**.

Managing Resources

Use the **Resources** link in the left pane to access settings in the **Resource Pools**, **Hosts**, **Datastores**, and **Media Stores** tabs. The information helps you to assess which resources are depleting. Review these definitions:

- **Resource pool** – Logical structure that allows delegation of control over the resources of a host. Resource pools compartmentalize all resources in a cluster. You can create multiple resource pools as direct children of a host or cluster and configure them. You can then delegate control over them to other individuals or organizations. The managed resources are CPU and memory from a host or cluster. Virtual machines execute in, and draw their resources from, resource pools.
- **Cluster** – Collection of ESX Server hosts with shared resources and a shared management interface. When you add a host to a cluster, the host's resources become part of the cluster's resources. The cluster manages the resources of all hosts.
- **Host** – Physical ESX Server machine where virtual machines are running.
- **Datastore** – Virtual representation of combinations of underlying physical storage resources in the datacenter. These physical storage resources can come from the local SCSI disk of the server, the Fibre Channel SAN disk arrays, the iSCSI SAN disk arrays, or Network Attached Storage (NAS) arrays.
- **Media store** – Directories for media files on NFS datastores.

See VMware Infrastructure 3 documentation for general information on resource pools, clusters, hosts, and datastores.

Highlights of the Resource Pools Tab

The **Resource Pools** tab presents this information:

- Name of the resource pool that provides a pop-up menu for various operations.
- Status of whether the resource pool is enabled for use.

  The Stage Manager administrator manually enables a resource pool.
- Service the resource pool is associated with.
- Name of the resource pool in VirtualCenter.
- Activity and errors for the most recent operation.

- Amount of CPU and memory in use and total amount of CPU and memory, as follows:
  - **Used** – Dynamic amount consumed by virtual machines in this resource pool or any child resource pool.
  - **Total** – Static upper-bound on usage. The value is based on the upper limit configured for the resource pool and for any parent resource pool.
- Number of virtual machines using the resource pool.
- Messages or alerts about activity that might raise errors in Stage Manager.

Use this tab to attach a resource pool. From a table in the tab, you can undeploy all virtual machines associated with a resource pool, disable, enable, detach, and access properties for a resource pool.

For a description of a resource pool, see "Managing Resources" on page 69.

Highlights of the Hosts Tab

The **Hosts** tab presents this information:

- Name of the ESX Server host that provides a pop-up menu for various operations.
- State of the host:
  - **Ready** – Host is ready for use.

    When Stage Manager prepares a host, it completes certain tasks such as checking the ESX Server version and installing an agent. If the host is not prepared properly, Stage Manager cannot mark it as ready for use.

    See "Understanding Host States" on page 74 for specifics on the **Ready** status.
  - **Available** – Host is set up but some condition exists in VirtualCenter that prevents Stage Manager from using this host.

    For example, the VirtualCenter administrator might put the host in maintenance mode, or the host is in a disconnected state. The **Messages** column relays such issues.

    See "Understanding Host States" on page 74 for specifics on the **Available** status.
  - **Enabled** – User flag to mark the host as available for virtual machine deployment.
- Activity and errors for the most recent operation.

- Name of the cluster.

  A compute resource (owner of the resource pool) can be a cluster or standalone host. The compute resource represents the sum of all CPU and memory of all hosts under it.

  If the compute resource is a standalone host, the cell in the **Cluster** column is empty.

- Reserved and total amount of CPU and memory for the host, as follows:
  - **Reserved** – Amount that Stage Manager reserves from the resource pool for running virtual machines in both this resource pool and any child resource pool.
  - **Total** – Static upper limit on usage. The value is based on the upper limit configured for the resource pool and for any parent resource pool.
- Resource pools associated with the host.
- Number of virtual machines deployed on the host.
- Alerts on VirtualCenter activity that might generate errors in Stage Manager.

From a table in the tab, you can undeploy, redeploy, and force undeploy all virtual machines on a host. Other operations include disabling and unpreparing hosts, along with accessing deployed virtual machines and properties of a host.

For a description of a host resource, see "Managing Resources" on page 69.

Highlights of the Datastores Tab

The **Datastores** tab presents this information:

- Name of the datastore that provides a pop-up menu for various operations.
- Type (for example, NFS or VMFS storage).
- State:
  - **Connected** – Indicates a host in Stage Manager is connected to the datastore.

    You can disconnect a datastore using VirtualCenter.
  - **Enabled** – Marks the datastore as available for use.

    You can disable the datastore to prevent users from deploying virtual machines or creating media files on the datastore.

- **VM Creation Enabled** – Allows you to store virtual machines in the datastore.
- **Media Store Creation Enabled** – Allows you to create media directories in the NFS datastore.

  These directories are known as media stores.

- Activity and errors for the most recent operation.
- Amount of datastore space in use and the total amount of space.
- Percentage of datastore space used.
- Alerts on VirtualCenter activity that might generate errors in Stage Manager.

  For example, Stage Manager creates an installation directory for virtual machines and generates a message if it discovers an existing directory with the same name.

Use this tab to view datastore usage. From a table in the tab, you can disable the datastore, disable the creation of virtual machines for the datastore, and disable the creation of media stores for the datastore. Other operations include accessing virtual machine contents and datastore properties, and removing datastores.

For a description of a datastore resource, see "Managing Resources" on page 69.

Highlights of the Media Store Tab

The **Media Stores** tab narrows the focus from overall datastores to media stores, the directories for media files on NFS datastores. The NFS datastores that contain media stores appear on the **Datastores** tab.

The **Media Stores** tab presents this information:

- Name of the media store that provides a pop-up menu for various operations.
- Type (NFS).
- State:
  - **Datastore Enabled** – Marks the datastore where the media store resides as available for use. Set this flag in the **Datastores** tab.
  - **Media Store Enabled** – Allows you to use media on the media store. If you disable a media store, the Stage Manager media library will not display the files on that media store.
- Amount of media store space in use and the total amount of space.
- Percentage of media store space used.
- Location.

Use this tab to add a media store. From a table in the tab, you can disable or remove a media store. Other operations include synchronizing the contents of the media store with the Stage Manager media library and accessing media store properties.

Attaching and Detaching Resource Pools

Use the **Resource Pools** tab to attach a resource pool to Stage Manager.

To attach a resource pool

1 In the left pane, click **Resources**.

2 Click the **Attach Resource Pool** button.

3 Select the resource pool.

4 (Optional) Enter a different name for the resource pool in Stage Manager.

5 Click **OK**.

If Stage Manager detects that a host is not prepared for Stage Manager (for example, it does not have an agent that Stage Manager installed on the host), a message appears asking if you want to start the Prepare Hosts wizard or go back and select a different resource pool.

To detach a resource pool

1 In the left pane, click **Resources**.

The resource pool must be disabled and all virtual machines associated with the resource pool must be undeployed. See "Enabling Resources" on page 77 and "Undeploying and Redeploying All Virtual Machines" on page 79.

2 In the **Resource Pools** tab, move the pointer over the resource pool and choose **Detach** from the menu.

3 Confirm the operation after reviewing the information about deploying configurations associated with the resource pool.

Understanding Host States

Review the various states that affect the Ready and Available status in the **Hosts** tab. See "Highlights of the Hosts Tab" on page 70.

Ready States

The following states affect the Ready status of hosts:

- **Not Supported** – Host is running a virtualization platform that Stage Manager does not support. You cannot use this host for Stage Manager operations.
- **Not Prepared** – Host is running a supported virtualization platform but the host is not yet prepared for Stage Manager management. See "Preparing and Unpreparing ESX Server Hosts" on page 76.
- **Pending Upgrade** – Host is prepared but running an older version of the Stage Manager agent software than the Stage Manager Server software. Stage Manager disables operations on this host until you use the pop-up menu in the **Hosts** tab to upgrade the agent.
- **No Managed Resource Pools** – Host is prepared but the resource pools attached to Stage Manager do not use it. This can occur when resource pools become detached from Stage Manager, or when the host moves to a different resource pool in VirtualCenter. Stage Manager does not use this host for most operations.

  You can unprepare the host to remove it from the list of hosts available for use in Stage Manager. Otherwise, Stage Manager keeps the host and makes it available if you attach a resource pool that uses it. Stage Manager renames the default portgroup when this condition occurs.
- **Default Portgroup Unavailable** – Host is prepared but the default portgroup that Stage Manager uses for connecting its virtual machines is removed from the host.

Available States

The following states affect the Available status of hosts:

- **Powered Off** – Host is powered off from VirtualCenter. You cannot use this host for Stage Manager operations.
- **In Standby Mode** – Administrator or the Distributed Power Management (DPM) feature puts the host in standby mode in VirtualCenter. You cannot perform most operations on this host, including unregistering a virtual machine from the host.

  For information about DPM, see VMware Infrastructure 3 documentation.

- **Entering Standby Mode** – Host is in the process of entering standby mode in VirtualCenter. Host is waiting for all virtual machines to power off or is putting the operating system in standby mode. You cannot perform most operations on this host, including unregistering a virtual machine from the host.
- **Removed from VirtualCenter** – Host is removed from VirtualCenter. Although you cannot use this host, force undeploy any virtual machines that Stage Manager had references to on that host. After force undeploying the virtual machines, you can unprepare the host. See "Preparing and Unpreparing ESX Server Hosts" on page 76.

  If someone adds the host back to VirtualCenter, you see a second host with the same name. You can only use this second host.
- **Disconnected from VirtualCenter** – Host is disconnected from VirtualCenter. VirtualCenter does not attempt to contact the host.
- **Not Responding to VirtualCenter** – VirtualCenter fails to contact the host. Host might be powered off, hung, or inaccessible on the network.
- **Entering Maintenance Mode** – VirtualCenter administrator is attempting to put the host in maintenance mode. Powered-on virtual machines prevent the host from entering this mode.

  Stage Manager does not use the host for new provisioning, but attempts to power off registered virtual machines succeed.
- **In Maintenance Mode** – VirtualCenter administrator puts the host in maintenance mode. The host cannot have powered-on virtual machines. The host can have suspended or powered off virtual machines.

  Stage Manager does not use the host for new virtual machines, but you can undeploy existing virtual machines.
- **Agent Not Responding** – Stage Manager Server system cannot contact the Stage Manager agent running on the host. The host might be powered off, uninstalled, hung, or inaccessible on the network (for example, a firewall blocks contact with the agent). Stage Manager renames the default portgroup when the condition occurs.
- **Moved Out of Datacenter** – Host is out of reach because someone moved the host to a different datacenter.

Preparing and Unpreparing ESX Server Hosts

Stage Manager prompts administrators to start the Prepare Hosts wizard after attaching a resource pool with hosts that are not yet prepared by Stage Manager. This preparation involves tasks such as installing an agent on the hosts.

You can also start the wizard from the **Hosts** tab for any hosts that are unprepared. Unprepared hosts include new hosts added to a cluster in VirtualCenter and hosts that are not prepared right after you attach a resource pool.

Unprepare a host to remove it from use in the Stage Manager environment.

To prepare a host

1 Click **Resources** in the left pane, click the **Hosts** tab, move the pointer over the unprepared host name, and choose **Prepare Host** from the menu.

If Stage Manager instead prompts you to launch the wizard after attaching a resource pool, click the **OK** button.

2 Provide connection details:

a Select or deselect the check box that specifies whether to use the same user name and password for all hosts.

b If you use the same user name and password for all hosts, enter the user name and password.

c Select the check boxes for hosts to prepare and enter individual user names and passwords if necessary.

If you start the wizard after attaching a resource pool, all unprepared hosts appear in the list, regardless of what cluster they belong to.

Click a host name to display a dialog box with summary information on the host.

3 From the list of networks, select a virtual switch for each host.

4 Select the check boxes for datastores to enable for virtual machine use.

To unprepare a host

1 Click **Resources** in the left pane.

2 In the **Hosts** tab, move the pointer over the host name and choose **Unprepare** from the menu.

3 Click **OK**.

During the unprepare operation, Stage Manager tries to uninstall the Stage Manager agent and remove the default portgroup. If this attempt fails, Stage Manager continues to unprepare the host and relays these failures in a message.

Renaming the Default Portgroup

Under certain conditions, Stage Manager attempts to rename the default portgroup on a host. For example, because Stage Manager might be aware of a reason to not deploy virtual machines on the host while VMotion and VMware DRS features might not be aware of the reason, Stage Manager renames the portgroup.

When Stage Manager is aware of a host with conditions that prevent virtual machine operations, it does not deploy virtual machines to that host. VMotion and VMware DRS are not aware of these conditions and might attempt to move virtual machines to this host. By renaming the default portgroup, Stage Manager prevents VMotion and VMware DRS from migrating virtual machines to this host. When those conditions no longer exist, Stage Manager attempts to rename the portgroup to its original name. A disabled host or these host states trigger these situations:

- No Managed Resource Pools
- Agent is Hung

For information about these states, see "Understanding Host States" on page 74.

If a condition exists that prevents the portgroup name change (for example, the host is disconnected from VirtualCenter), Stage Manager makes the change at a later time.

Enabling Resources

Stage Manager administrators can enable resource pools, hosts, datastores for virtual machines, and datastores for media. Use the **Datastores** tab to enable virtual machine and media store creation. Use the **Media Stores** tab to enable media use on a media store.

To enable a resource pool, host, or datastore

1 In the left pane, click **Resources**.

2 In the **Resource Pools**, **Hosts**, or **Datastores** tab, move the pointer over the resource and choose **Enable** from the menu.

To enable a media store for media use

1 In the left pane, click **Resources**.

2 In the **Media Stores** tab, move the pointer over the media store and choose **Enable Media Store** from the menu.

To enable virtual machine creation in a datastore

1 In the left pane, click **Resources**.

2 In the **Datastores** tab, move the pointer over the resource and choose **Enable VM Creation** from the menu.

To enable media store creation in a datastore

1 In the left pane, click **Resources**.

2 In the **Datastores** tab, move the pointer over the resource and choose **Enable Media** from the menu.

Disabling Resources

Disable a resource to block the use of it. This operation notifies you that you cannot deploy configurations in stages associated with the resource.

Disabling a host is useful when performing maintenance on it. Deployed virtual machines on the host remain deployed on the host, and operations on the virtual machines continue to take place. Operations on undeployed virtual machines (for example, deploy, import, and clone) do not take place on the host.

Stage Manager renames the default portgroup when a host is disabled.

Use the pop-up menu in the **Datastores** tab to disable the creation of virtual machines or media stores. Operations associated with existing virtual machines or media stores are unaffected unless the operations involve cloning actions. Specifically, disabling virtual machine creation prevents all cloning activity that occurs not only in literal clone operations but also in other operations, as follows:

- Making linked or full clones
- Archiving configurations
- Taking snapshots
- Reverting snapshots
- Creating templates or virtual machines
- Adding new virtual machines to existing configurations

- Importing virtual machines
- Transferring configurations to services (using the **Copy Configuration** radio button)

To disable a resource pool, host, or datastore

1 In the left pane, click **Resources**.

2 In the **Resource Pools**, **Hosts**, or **Datastores** tab, move the pointer over the resource and choose **Disable** from the menu.

To disable a media store for media use

1 In the left pane, click **Resources**.

2 In the **Media Stores** tab, move the pointer over the media store and choose **Disable Media Store** from the menu.

To disable virtual machine creation in a datastore

1 In the left pane, click **Resources**.

2 In the **Datastores** tab, move the pointer over the resource and choose **Disable VM Creation** from the menu.

To disable media store creation in a datastore

1 In the left pane, click **Resources**.

2 In the **Datastores** tab, move the pointer over the resource and choose **Disable Media** from the menu.

Undeploying and Redeploying All Virtual Machines

Stage Manager administrators can undeploy all virtual machines associated with the host and redeploy them on a different host. This is useful when you need to perform maintenance on a host.

Undeploying all virtual machines affects the users of those virtual machines and requires someone to redeploy those virtual machines manually.

If many configurations exist, you might have difficulty locating the correct configuration. Redeploy all virtual machines addresses this issue and attempts to redeploy all the virtual machines on another host. This requires disabling the original host and verifying that you have enough capacity on other hosts. If the redeploy operation fails on a virtual machine, the whole operation stops.

If you redeploy virtual machines in a suspended state, make sure that the other hosts are CPU compatible. The suspend operation for individual virtual machines suspends the state of virtual machines.

If a configuration is fenced, all virtual machines in that configuration move together to another host.

To undeploy all virtual machines in a resource pool

1 In the left pane, click **Resources**.

2 In the **Resource Pools** tab, move the pointer over the resource pool and choose **Undeploy All VMs** from the menu.

To undeploy all virtual machines in a resource pool

1 In the left pane, click **Resources**.

2 In the **Hosts** tab, move the pointer over the host and choose **Undeploy All VMs** from the menu.

To redeploy all virtual machines on a host

1 In the left pane, click **Resources**.

2 Click the **Hosts** tab.

The host must be disabled to redeploy virtual machines. See "Disabling Resources" on page 78.

3 In the **Hosts** tab, move the pointer over the host and choose **Redeploy All VMs** from the menu.

Viewing Deployed Virtual Machines on a Host

You can view the deployed virtual machines on a specific ESX Server host. To view the deployed virtual machines across all hosts, see "Monitoring Deployed Virtual Machines" on page 168.

To view the deployed virtual machines on a host

1 In the left pane, click **Resources**.

2 In the **Hosts** tab, move the pointer over the host and choose **Deployed VMs** from the menu.

On this page, a table includes this information:

- Access to the virtual machine console through the thumbnail icon.
- Name of the virtual machine includes a pop-up menu to view the virtual machine console or undeploy the virtual machine.
- Status whether the virtual machine is deployed.
- Service, stage, and configuration the virtual machine resides in.

  A dash in the **Configuration** column indicates the virtual machine is a template.
- IP address of the virtual machine or DHCP specification.
- External IP address for the virtual machine if it runs in fenced mode.

  See Appendix C, "Network Fencing," on page 181.
- Template that serves as the basis of the virtual machine.

  This is useful when you plan on retiring a template and need to evaluate its usage. When a template is removed for a configuration or is deployed, a dash appears in the **Template** column.
- Person who deployed the virtual machine.
- Date and time of deployment.
- Creator of the virtual machine.
- Messages about the virtual machine.

Editing Resource Pool Properties

Stage Manager administrators can edit resource pool properties.

To edit resource pool properties

1 In the left pane, click **Resources**.

2 In the **Resource Pools** tab, move the pointer over the resource pool and choose **Properties** from the menu.

3 Review the resource, service, stage, and datastore information and enter the name or description.

4 Clear messages regarding VirtualCenter activity if necessary.

5 Click **OK**.

Editing Host Properties

Stage Manager administrators can edit properties for ESX Server hosts.

To edit host properties

1 In the left pane, click **Resources**.

2 In the **Hosts** tab, move the pointer over the resource pool and choose **Properties** from the menu.

3 Review or update properties:

   a Enter a description.

   b Enter a user name and password for the host.

   c Select a virtual switch from the drop-down list.

   You can make this change when the host does not have any deployed virtual machines.

   d Enter the maximum number of deployed virtual machines allowed on the host.

   The **Maximum Number of VMs** field is only available for a cluster without DRS and applies to the virtual machines deployed in this Stage Manager installation. Stage Manager might raise the quota over the maximum value of 200 in certain circumstances. See "Circumstances Affecting the Quota for Deployed Virtual Machines" on page 82.

   e Select the check boxes to enable different datastores for virtual machine use.

   You can only deploy virtual machines on selected datastores.

   f Clear messages regarding VirtualCenter activity if necessary.

4 Click **OK**.

Circumstances Affecting the Quota for Deployed Virtual Machines

Although the maximum quota for deployed virtual machines on a host is 200, that number might increase in these circumstances:

- VMotion or VMware HA failover occurs.

  For example, promoting a configuration to another stage might involve a change in resource pools that can trigger VMotion.

- If someone switches a DRS cluster to a cluster without DRS, the default quotas associated with that non-DRS cluster can negate the Stage Manager quota.

Editing Datastore Properties

Stage Manager administrators can edit VMFS and NFS datastore properties.

To edit datastore properties

1 In the left pane, click **Resources**.

2 In the **Datastores** tab, move the pointer over the resource pool and choose **Properties** from the menu.

3 Review or update datastore properties:

   a Enter a display name.

   b Enter a value for **Disk Space Threshold Yellow**.

   When available disk space falls below this level, Stage Manager sends an email warning message to all Stage Manager administrators.

   c Enter a value for **Disk Space Threshold Red**.

   When available disk space falls below this level, Stage Manager sends an email alert message (more severe than the **Disk Space Threshold Yellow** message) to all Stage Manager administrators.

   d Clear messages regarding VirtualCenter activity if necessary.

4 Click **OK**.

Editing Media Store Properties

Stage Manager administrators can edit media store properties.

To edit media store properties

1 In the left pane, click **Resources**.

2 In the **Media Stores** tab, move the pointer over the resource pool and choose **Properties** from the menu.

3 Enter the name of the media store.

4 Click **OK**.

Viewing Virtual Machine Datastore Usage

In the Virtual Machine Datastore Usage page, Stage Manager administrators can assess disk space usage for all virtual machines and complete maintenance tasks.

On this page, a table includes this information:

- Virtual machine name that provides a pop-up menu for operations.
- Name of the configuration containing the virtual machine.

  A dash appears in this column for templates.
- VMFS datastore for the virtual machines.
- Status (for example, deployed or undeployed) of the virtual machine.
- Amount of space that you can reclaim upon deleting the virtual machine.

  This space includes the area occupied by the virtual machine directory and "parent" directories up to an ancestor that has "children" or other dependent directories. For information about virtual machine directories and disk space assessment, see "Assessing Virtual Machine Disk Space" on page 85.

  NOTE Use the **Refresh Disk Space** button to refresh the disk space to view a current estimate of the space.
- Number of delta disks generated by certain operations.

  For various changes, Stage Manager freezes the original delta disk and creates a new one.

  The chain length indicates how scattered the virtual machine image is across the directories of a datastore. Stage Manager messages the user when you need to consolidate a chain.
- Date to automatically undeploy or delete virtual machines.

  If Stage Manager flags a virtual machine for deletion and the storage lease expires, this column displays the date of expiration.

Use the **Delete Expired VMs** button on this page to delete all undeployed virtual machines with a storage lease that expired. From a table on the page, you can view the high-level topography of the virtual machine directories, consolidate and delete virtual machines, and access virtual machine properties.

To access virtual machine datastore usage

1 In the left pane, click **Resources**.

2 In the **Datastores** tab, click the **View Datastore Usage** button.

To view the usage of a single datastore rather than the contents of all virtual machine datastores, click the **Datastores** tab, move the pointer over the datastore name, and choose **Details** from the menu.

Assessing Virtual Machine Disk Space

Stage Manager helps administrators maintain datastore content by providing a graphic view of disk space usage. While the **Disk Space Freed Upon Deletion (MB)** column on the Virtual Machine Datastore Usage page informs you how much total storage (inclusive of the space occupied by hidden nodes associated with the virtual machine) can be reclaimed upon deletion of a virtual machine, the context view on that same page provides the high level topography of directories that you can use to identify "hidden" nodes in the interior area of the directory structure. Use this view to assess the disk space that would become available if you deleted a particular virtual machine and its chain of internal nodes.

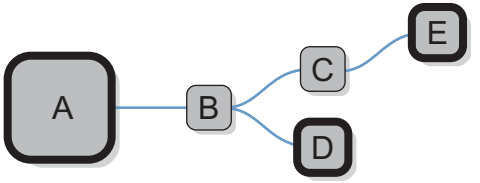
Deleting a virtual machine actually means deleting the storage occupied by the virtual machine directory and ancestor directories that can be safely deleted. Stage Manager stores files in a "tree" of related linked clones. For operations such as cloning, Stage Manager creates a delta disk instead of copying an entire virtual hard disk. With each change, Stage Manager freezes the original delta disk and creates a new one. The virtual machine disk as a whole consists of its own delta disk and the delta disks of ancestor disks.

You cannot delete an ancestor node under these conditions:

- The ancestor directory has other child directories dependent on it.
- A virtual machine (for example, a template or virtual machine in the configuration library) is associated with that ancestor node.
- Another node uses the ancestor node as a revert point. For example, a full clone operation might consolidate and create a new disk but refer to the revert point of the original chain.

Figure 3-1 shows a basic example of virtual machine and internal nodes affected by a delete operation.

Figure 3-1. Example of Nodes Affected by a Delete Operation



If you delete node D in this sample directory tree, node B stays intact because node C and E are dependent on it. If you delete node E, the space for node E and node C becomes available because the deletion affects all nodes up to a directory with child dependencies (node B).

In the context view, view the chains of virtual machine and internal node directories from right to left to move up the lineage chain toward ancestor directories. Boxes with thick borders represent the virtual machines that you can see in the Stage Manager Web console. Boxes with lighter borders represent the "hidden" internal directories associated with the virtual machines. Deletion of internal nodes only occurs as a side effect of deleting the virtual machines associated with those nodes.

Blue boxes indicate deployed directories while yellow boxes indicate the selected virtual machine. The gray color is the default color for directories.

If you move the pointer over a box, you can see various details including the amount of space the virtual machine or internal node consumes and the total amount of space reclaimed with the removal of all attached or "hidden" nodes. For example, if you see Size: 277 MB (554 MB), the first number (277) reflects the space of the selected node and the number in parentheses (554) reflects the total space. This total amount is calculated by adding the space of the node and all associated nodes to the right of the selected node.

Previously deployed and currently deployed virtual machines show **Last Deployed** information. Internal nodes do not display this information.

A revert reference appears as a turquoise box. This reference point implies another directory (created by a full clone operation on a different datastore) exists outside of the displayed directory tree but uses a directory linked to this revert reference as a revert point. This dependency affects your ability to delete directories.

To delete a directory linked to a revert reference, delete the virtual machine associated with the revert reference and the descendants of the directory.

To assess virtual machine disk space with the Context view

1 Click **Resources** in the left pane.

2 In the **Datastores** tab, click the **View Datastore Usage** button.

To view the usage on a single datastore, move the pointer over the datastore name and choose **Details** from the menu.

3 Click the **Refresh Disk Space** button to ensure the data is current.

4 Move the pointer over the virtual machine name and choose **Context** from the menu.

The image of the virtual machine directory structure and dependencies appears.

Consolidating Virtual Machines After Assessing Datastore Usage

You can consolidate virtual machines in the Virtual Machine Datastore Usage page. For information about the consolidate operation, see "Consolidating Virtual Machines" on page 155.

To consolidate virtual machines after assessing datastore usage

1 Click **Resources** in the left pane.

2 In the **Datastores** tab, click the **View Datastore Usage** button.

To view the usage on a single datastore, move the pointer over the datastore name and choose **Details** from the menu.

3 Move the pointer over the virtual machine name and choose **Consolidate** from the menu.

4 Select a datastore for the virtual machine.

5 Click **OK**.

Deleting Virtual Machines and Configurations After Assessing Datastore Usage

You can delete virtual machines and configurations in the Virtual Machine Datastore Usage page.

To delete virtual machines or configurations after assessing datastore usage

1 Click **Resources** in the left pane.

2 In the **Datastores** tab, click the **View Datastore Usage** button.

To view the usage on a single datastore, move the pointer over the datastore name and choose **Details** from the menu.

3 Move the pointer over an undeployed virtual machine name and choose **Delete** from the menu to delete a virtual machine or **Delete Configuration** to delete the whole configuration that contains the virtual machine.

4 Confirm the deletion.

Editing Template and Virtual Machine Properties After Assessing Datastore Usage

Stage Manager administrators can edit virtual machine properties in the Virtual Machine Datastore Usage page. For information about the properties, see "Editing Basic Template Properties" on page 55 for templates or "Editing Basic Virtual Machine Properties" on page 156 for virtual machines in configurations.

To edit virtual machine properties after assessing datastore usage

1 Click **Resources** in the left pane.

2 In the **Datastores** tab, click the **View Datastore Usage** button.

To view the usage on a single datastore, move the pointer over the datastore name and choose **Details** from the menu.

3 Move the pointer over the virtual machine name and choose **Properties** from the menu.

4 Update the appropriate properties.

Adding NFS Datastores to Stage Manager

You can add NFS datastores by attaching them to your ESX Server hosts through VirtualCenter.

Adding Media Stores to Stage Manager

Adding a media store involves enabling an NFS datastore in the **Datastores** tab for media and then adding the media store in the **Media Stores** tab. You can use the same NFS datastore for media and virtual machines.

To add a media store

1 Click **Resources** in the left pane.

2 In the **Datastores** tab, move the pointer over an NFS datastore and choose **Enable Media** from the menu.

3 In the **Media Stores** tab, click the **Add Media Store** button.

4 Provide media store details:

- Name that contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods
- Datastore name in VirtualCenter
- Path relative to the mount point

5 Click **OK**.

The media store appears enabled on the tab.

Removing Datastores

Removal of a datastore deletes all virtual machines, media stores, or media files from the Stage Manager database.

NOTE The operation does not delete files in the actual datastore.

You cannot remove a datastore until you complete these tasks:

- Disconnect the datastore in VirtualCenter.

  For example, if the datastore is connected to three hosts managed by Stage Manager, disconnect the datastore from all three hosts through VirtualCenter.

- Disable the datastore.

  See "Enabling Resources" on page 77.

- Make sure media files associated with an NFS datastore are not in use before removing the datastore.

  If you remove an NFS datastore with media stores and you add the NFS datastore to the Stage Manager environment at a later time, you need to recreate media stores because the original ones are no longer available.

To remove a datastore

1 Click **Resources** in the left pane.

2 In the **Datastores** tab, move the pointer over the datastore and choose **Remove** from the menu.

Configuring Network Settings

Configuring network settings involves viewing network settings and managing IP addresses.

Use the **Network** link in the left pane to access information in the **General** tab and **IP Pool** tab.

Highlights of the General Tab

The **General** tab sets default network settings and the Stage Manager installation ID. Consult your network IT administrator for questions on reserved IP addresses and settings established prior to the installation.

These settings affect IP allocation and the installation ID. See "Using Static IP and DHCP Networking" on page 92 and "Reviewing the Installation ID" on page 93.

To edit system-wide network settings

1 In the left pane, click **Network**.

2 In the **General** tab, specify the choices for IP address allocation users see in the Stage Manager Web console, as follows:

   a Select the **DHCP** check box, **Static (IP pool)** check box, **Static (manual)** check box, or any mix of check boxes.

   Stage Manager allows you to use a different method of allocation for each virtual machine.

   b Select the default IP setting for a new virtual machine.

3 To alter the static IP addresses from a pool originally set up using the Initialization wizard and you selected the **Static (IP pool)** check box, enter the DNS, gateway, and subnet mask information in the **Static IP Settings** section of this tab.

   Stage Manager uses the network settings for unfenced virtual machines and the external IP addresses of fenced virtual machines.

   The maximum number of IP addresses you can add at one time is 1024.

4 Enter an installation ID if it conflicts with the ID of another Stage Manager installation on your network.

   The installation ID affects the unique MAC addresses required to deploy virtual machines.

5 Click **OK**.

Highlights of the IP Pool Tab

The IP Pool tab presents this information on the Stage Manager IP pool:

- Number of IP addresses in the IP pool.
- Number of available IP addresses.
- Virtual machine IP address.
- IP address allocation status.
- Virtual machine deployment status.

  A hyphen ("-") indicates the virtual machine is not deployed.
- IP address assignment status for virtual machines and virtual routers.

- Virtual machine name.

  Virtual machines can use the same names unless they are in the same configuration.

- Configuration to which the virtual machine is assigned.

Use this page to add and remove a range of IP addresses.

Using Static IP and DHCP Networking

You can use static IP or DHCP networking in Stage Manager on a per-virtual machine basis.

To avoid setting up an IP range, use DHCP to pull IP addresses from a DHCP server. DHCP does not work with fencing, a network architecture that allows multiple users to work with live instances of the same virtual machine configuration on the same network. See Appendix C, "Network Fencing," on page 181.

To use a static IP address, you can enter an IP address manually or use the static IP pool. The pool requires you to specify an IP range, DNS suffix, gateway, netmask, and DNS information. You can add an unlimited number of f IP addresses. The static IP pool works with network fencing.

When you create a virtual machine from a template, and you select a static IP allocation method, Stage Manager allocates an IP address from the IP pool to the virtual machine. This IP address stays with the virtual machine through the various operations in Stage Manager. When you delete all instances of the virtual machine with this IP address, Stage Manager releases the IP address to the IP pool.

If you deploy a configuration in fenced mode, Stage Manager allocates an additional IP address from the IP pool and assigns it as the external IP address for each virtual machine in the configuration. You can use the external IP address to access the virtual machine from outside the fenced configuration (for example, from your desktop). When you undeploy this configuration, Stage Manager releases the IP address to the IP pool.

Reviewing the Installation ID

Stage Manager uses the installation ID to generate MAC addresses for virtual machines.

If you have more than one Stage Manager installation on the same network, each installation must have a unique ID. Stage Manager randomly assigns an ID and allows the administrator to manually edit the value in case an ID collision occurs. Setting a unique installation ID ensures the virtual machine network traffic of each installation does not interfere with each other.

Stage Manager generates hundreds of MAC addresses based on the installation ID. Stage Manager assigns these MAC addresses to virtual machines. If you have more than one Stage Manager installation on a network with the same installation ID, Stage Manager generates the same set of MAC addresses for both installations and causes a MAC address conflict that can create complications.

Stage Manager cannot regenerate MAC addresses on deployed machines. If you change the installation ID in an environment with deployed virtual machines, the change fails because some addresses are in use.

Adding IP Addresses to the Stage Manager IP Pool

Stage Manager administrators can add a maximum of 1024 IP addresses at a time to the IP pool. No limit exists on the number of total addresses you can use.

Every virtual machine requires an IP address. A virtual machine requires an additional IP address for fenced mode.

Every virtual router (automatically created for fenced configurations) requires two IP addresses. Virtual machine IP addresses remain allocated until you delete a virtual machine. The addresses for a virtual router return to the IP pool when you undeploy a fenced configuration.

To add an IP address

1 From the **IP Pool** tab, click **Add**.

2 Enter a range of IP addresses.

3 Click **OK**.

Removing IP Addresses from the Stage Manager IP Pool

Stage Manager administrators can remove IP addresses from the IP pool.

To remove IP addresses

1 From the **IP Pool** tab, click **Remove**.

2 Enter a range of IP addresses.

The "From" address must be less than the "To" address.

You cannot delete IP addresses allocated to a virtual machine.

3 Click **Delete**.

Configuring Stage Manager Settings

Stage Manager administrators can use the **Settings** link in the left pane to access the **General**, **License**, **Guest Customization**, **Support**, **Resource Cleanup**, and **VirtualCenter** tabs.

For information about operations in the **Guest Customization** tab, see "Building a Microsoft Sysprep Package for Guest Customization" on page 42 and "Disabling the Check of VMware Tools Prior to Publishing Templates" on page 44.

For information about the **VirtualCenter** tab, see "Managing VirtualCenter and Datacenters" on page 105.

Reviewing the General Tab

The **General** tab covers server preferences, email preferences, default user preferences, and default deployment options.

To update settings on the General tab

1 In the left pane, click **Settings**.

2 In the **General** tab, specify server preferences:

- Login mode:
  - **Remember User Name Only** – Stage Manager retains the user name but not the password.
  - **Automatically Login** – Stage Manager logs users in when they start the Stage Manager application.

Stage Manager uses persistent cookies (physically stored in the computer hard disk) to retain the login information. If you delete the browser cookies, this information is no longer available until the next time you log in

- Stage Manager Server IP address.
- Stage Manager Server DNS name.
- Amount of time the Stage Manager application remains active without user interaction.
- Frequency for checking whether ESX Server hosts are accessible or hung.

  The default value is 60 seconds.
- Time to wait before marking a host as hung.

  For example, if the timeout is 20 seconds and Stage Manger pings a host every 10 seconds, Stage Manager marks the system as hung if it fails to respond for 20 seconds.

  The default value is 30 seconds.
- Maximum number of deployed virtual machines allowed on the host.

  The default value is 64. For information about quotas, see "Editing Host Properties" on page 82 and "Circumstances Affecting the Quota for Deployed Virtual Machines" on page 82.
- Timeout when importing a virtual machine from VirtualCenter.

  When Stage Manager imports a virtual machine from VirtualCenter, VirtualCenter clones the virtual machine. The timeout value applies to this cloning task.

  The default value is 120 minutes.
- Timeout when importing or exporting virtual machines from SMB storage.

  The default value is 120 minutes. If you try to import a virtual machine with a large hard disk and the operation times out, increase this timeout.

- Frequency of garbage collection on datastores.

  Garbage collection is the automatic detection and freeing of images that are no longer in use. Stage Manager does not immediately delete files associated with a deleted virtual machine. Stage Manager stores virtual machine files in a tree of related-linked clones (see "Assessing Virtual Machine Disk Space" on page 85). Each pass of the garbage collector involves an attempt to delete any nodes that no longer have dependencies. Several passes over time might be required to free up the space associated with a deleted virtual machine.

  The default value is 120 seconds.

- Amount of log history to display in the Web console.

  A value of `0` shows all activity. The default value is 30 days.

- Background image.

  If you have a slow or remote connection to Stage Manager, you can turn off the background image to speed up loading time.

3 Update the LDAP binding string, groups, and validation information.

  Refer to this sample Lightweight Directory Access Protocol (LDAP) string:

  `"LDAP://your_ldap_servername/department='QA',DC=companyabc,DC=com"`

  See "Microsoft Active Directory and Stage Manager" on page 98. For more information about LDAP binding strings and formatting methods, open the Microsoft Developer Network (MSDN) Web site and search for LDAP ADsPath.

4 Update email preferences:

  - DNS host name or IP address of a mail server that Stage Manager uses for sending out email alerts and warnings
  - SMTP user name and password if you specify an SMTP server
  - Initial default text for the subject field of message

  See "Conditions for SMTP Alerts" on page 97.

5 Click the **Test SMTP Settings** button to verify the server connection works.

6 Specify whether to send email alerts for system issues, such as low disk space for a datastore, to all Stage Manager administrators or specific email addresses separated by commas.

7 Specify whether to use a network architecture mode for deploying configurations:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.
- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

See Appendix C, "Network Fencing," on page 181.

8 Enter an integer number indicating the delay in seconds (or "pause") between the power on process of this virtual machine and the next virtual machine.

For example, if you have a database server and a Web application, you might want to make sure the database server is powered on with all services running before powering on the Web application.

9 To boot virtual machines in the sequence specified during the creation of the configuration, select the **Use Server Boot Sequence** check box.

10 Click **OK**.

Conditions for SMTP Alerts

Stage Manager administrators receive email alerts or warnings under these conditions:

- Status of a host or datastore changes
- Disk threshold (yellow or red) of a host or datastore is crossed
- Stage Manager loses or resumes the connection to the VirtualCenter Server
- Stage Manager detects that an ESX Server host is not responding or starts responding

Microsoft Active Directory and Stage Manager

Stage Manager administrators can configure Stage Manager to create and authenticate user credentials against an Active Directory server instead of the Stage Manager user database. This setup eases the user administration of the system. Instead of manually creating all the user accounts, you enable an entire company (or subset) of users by pointing the installation to the appropriate Active Directory domain or domain controller.

To point Stage Manager to an Active Directory domain, enter an LDAP binding string and optional group specification in the administrator settings area of the Web console. See "LDAP Binding and Group Strings" on page 100.

When a user initially tries to log in to Stage Manager with an unknown login, Stage Manager checks the credentials against the Active Directory domain. If the credentials succeed, Stage Manager creates a new default user account, marks that account as an LDAP account, and logs the user in to the system.

Administrators can alter the records of an existing user and change the way Stage Manager authenticates a user. For example, you can give an LDAP account administrative privileges. You can also specify whether Stage Manager authenticates users using the Active Directory domain or the Stage Manager database.

If you create a user account in Stage Manager, and the LDAP server has an account with the same user name, Stage Manager only authenticates the user against the Stage Manager account. The LDAP credentials are not valid in Stage Manager unless you complete one of these options:

- Delete the Stage Manager account with that user name.
- If you are a Stage Manager administrator authenticated again an LDAP account, log into Stage Manager, edit the user properties for the user you want to authenticate against the LDAP server, and select the **Is LDAP** check box.
- If you are a Stage Manager administrator without an LDAP account, navigate to the **General** tab of the Settings page, deselect the **Validate LDAP Users when Edited** check box, navigate to the properties of the user, and select the **Is LDAP** check box.

Authenticating Users Against LDAP

The procedures to authenticate LDAP users depend on whether the logged-in Stage Manager administrator was authenticated using LDAP.

To specify a user authentication method as a Stage Manager Administrator already authenticated against the LDAP server

1 In the left pane, click **Settings**.

2 If you plan to change a user from a non-LDAP designation to an LDAP designation, select the **Validate LDAP Users when Edited** check box.

Because the administrator selecting the check box is already authenticated as an LDAP user, this check box enables the **Is LDAP** check box on the properties page for users and allows Stage Manager to validate the existence of the user in the Active Directory domain (see Step 5).

3 In the left pane, click **Users**.

4 Move the pointer over the user name and choose **Properties** from the menu.

5 Specify an authentication method:

- Selecting the **Is LDAP** check box and clicking **OK** ensures that the Active Directory domain, rather than the Stage Manager user database, authenticates this user when he or she logs in to the Web console. See "LDAP Binding and Group Strings" on page 100.

  If Stage Manager cannot validate the user as an LDAP user, a message appears noting the issue.

- Deselecting the **Is LDAP** check box and clicking **OK** ensures the Stage Manager user database, rather than an Active Directory domain, authenticates this user when he or she logs in to the Web console.

To specify the user authentication method as a Stage Manager Administrator without LDAP server access

1 In the left pane, click **Settings**.

2 Deselect the **Validate LDAP Users when Edited** check box.

This action activates the **Is LDAP** check box described in Step 5.

3 In the left pane, click **Users**.

4 Move the pointer over the user name and choose **Properties** from the menu.

5 Specify the authentication method.

- Selecting the **Is LDAP** check box and clicking **OK** ensures an Active Directory domain, rather than the Stage Manager user database, authenticates this user when he or she logs in to the Web console. See "LDAP Binding and Group Strings" on page 100.

  Because the Stage Manager administrator is not authenticated against the Active Directory domain, the administrator cannot use the validation process available to LDAP users.

- Deselecting the **Is LDAP** check box and clicking **OK** ensures that the Stage Manager user database, rather than an Active Directory domain, authenticates this user when he or she logs in to the Web console.

LDAP Binding and Group Strings

The LDAP binding string references the Microsoft Active Directory service that Stage Manager uses to authenticate users who are unknown or marked as LDAP users. The Active Directory service must be running to allow LDAP users to log in to Stage Manager. You can modify the scope of the users using Active Directory organizational units (OUs) and specific group information.

LDAP Binding String Usage

Review this usage:

```
LDAP://<server>/<object>
```

The `LDAP` letters at the beginning of the string must use capital letters.

You can use three approaches for this usage:

- Combination of server and object names
- Server name
- Object name

  If you use just an object name, Stage Manager uses serverless binding that connects to any available domain controller. Serverless binding provides redundancy and load-balancing benefits. If security considerations prevent you from using serverless binding, specify a fully qualified domain name for the domain (for example, `vmware.com`) or domain controller (for example, `dc1.vmware.com`).

Use `<object>` to specify the location in the Active Directory tree where Stage Manager connects. Connecting at the root is best. To connect to a node in the tree, specify the distinguished name for that node.

LDAP Binding String Examples

```
LDAP://DC=vmware,DC=com
```

This example uses serverless binding to connect to the root of the Active Directory tree.

```
LDAP://vmware.com/DC=vmware,DC=com
```

This example binds to the vmware.com Active Directory domain tree at the root.

```
LDAP://vmware.com/OU=StageManager,DC=vmware,DC=com
```

This example binds to the vmware.com Active Directory domain tree at the StageManager OU.

To enter LDAP binding and group strings

1 In the left pane, click **Settings**.

2 In the **General** tab, enter the LDAP binding string.

Point the LDAP binding string to the node in the Active Directory tree that contains both the groups and users to be validated.

3 (Optional) Enter the **LDAP Allowed Groups** information to further restrict the LDAP user to specific LDAP groups.

The Active Directory administrator, not the Stage Manager administrator, defines these groups. If you complete this field, an LDAP user must be a member of one of the listed groups. If you leave the field blank, any user on the Active Directory domain can log in to Stage Manager. If you specify an OU in the LDAP binding string, only users in that OU can log in to Stage Manager.

Enter a string of groups separated by commas. A sample string is `QA,Dev,Tech Pubs`.

Using OUs and Groups

The following examples demonstrate how OUs and groups can limit access to Stage Manager.

Assume this scenario:

- Domain name – mydomain.com
- Top Level OUs – DublinOffice and HeadOffice

- Other OUs – StageManager (created inside of HeadOffice)
- Groups – Labusers group inside StageManager OU. The Labusers group contains users from both the DublinOffice and HeadOffice OU.

Example Using an OU and Allowed Groups

- LDAP Binding String – `LDAP://mydomain.com/OU=HeadOffice, dc=mydomain,dc=com`
- LDAP Allowed Groups – `Labusers`

In this example, only users in the HeadOffice OU that are also members of the Labusers group are validated. Users in the DublinOffice OU that are in the Labusers group are *not* validated, since the LDAP binding string specifies the HeadOffice OU.

Example Using Allowed Groups Only

- LDAP Binding String – `LDAP://mydomain.com/ dc=mydomain,dc=com`
- LDAP Allowed Groups – `Labusers`

In this example, all users in the domain (namely, those in the HeadOffice OU and DublinOffice OU) that are also members of the Labusers group are validated.

Nested Groups

If the parent group of a user is listed in the **LDAP Allowed Groups** field, the user has the same login access.

Reviewing the License Tab

The **License** tab show details on the license, such as expiration and capacity. Use this page to update the Stage Manager Server license or add a capacity license.

Editing the Stage Manager Server License

You can update the serial number for the license that enables the Stage Manager Server system.

To update the Stage Manager Server license

1 In the left pane, click **Settings**.

2 In the **License** tab, click the **Edit Server License** button.

3 Enter the serial number.

4 Click **OK**.

Adding a Stage Manager Server Capacity License

Stage Manager capacity is licensed on a per-processor or per-socket basis for prepared ESX Server hosts. You need at least two processors of available licensed capacity to prepare a dual-processor host.

You can enter multiple capacity licenses. For example, if you have one capacity license for 10 CPU and another capacity license for 10 CPU, Stage Manager is licensed for 20 CPU.

To add a capacity license

1 In the left pane, click **Settings**.

2 In the **License** tab, click the **Add Capacity License** button.

3 Enter the serial number.

4 Click **OK**.

Reviewing the Support Tab

If VMware support requires information about your environment, a representative might direct you to the **Support** tab.

To collect information for VMware Support

1 In the left pane, click **Settings**.

2 Click the **Support** tab.

3 Click the **Collect** button.

This generates a URL that you can use to download information for VMware support.

Reviewing the Resource Cleanup Tab

The **Resource Cleanup** tab defines lease times for deployed templates and configurations. Specifically, you can schedule the undeployment and deletion of templates and configurations.

Lease times can change after the initial setting, as follows:

- If a Stage Manager administrator sets a lease time, a user without Stage Manager administrator privileges cannot override the value but can extend the lease to any value up to the value set by the administrator. Users have access to lease information in the properties pages for templates, virtual machines, and configurations.

- If a Stage Manager administrator changes the value after the initial setting, a user can extend a lease to the original maximum value. Once a user alters the lease time, the lease choices reset up to the latest value determined by the Stage Manager administrator.
- If the Stage Manager administrator sets the value of the lease time to **Never Expires**, a user without administrator privileges has the ability to set a lease time.

Storage leases are not applicable to published templates or deployed templates and virtual machines. Once a template changes from a published to unpublished state, or a template or virtual machine changes from a deployed to undeployed state, the storage lease begins.

A storage lease is intended to delete unused or inactive objects. The following operations renew the lease because Stage Manager identifies the object as in use:

- Unpublish
- Make Full Clone
- Make Linked Clone
- Export
- Consolidate

Setting or changing these properties for templates and virtual machines renews the lease because Stage Manager identifies the object as in use:

- Memory
- Use Time Synchronization

To set deployment and storage leases

1 In the left pane of the console, click **Settings**.

2 In the **Resource Cleanup** tab, provide deployment and storage lease details:

- Time to undeploy lifecycle configurations and templates

  The default value is **Never Expires**.

- Time to delete lifecycle configurations, templates, and archived configurations, or mark these configurations and templates for deletion

  The default value is **Never Expires**.

3 Specify the timeframe for email alerts on deployment and storage lease expiration:

- Amount of time before a template or configuration is automatically undeployed

  Stage Manager administrators receive notification of template expiration and service administrators receive notification of configuration expiration in a service.

- Amount of time before a template or configuration is automatically deleted or marked for deletion

  This option for marking or permanent deletion is preset by the Stage Manager administrator.

4 Click **OK**.

Managing VirtualCenter and Datacenters

From the **VirtualCenter** tab, you can reconnect to the VirtualCenter Server, change a port number for the VirtualCenter Server if the default port is not in use, and switch VirtualCenter systems.

If Stage Manager loses the connection to the VirtualCenter Server, Stage Manager attempts to reconnect periodically but the **VirtualCenter** tab allows you to force the connection process.

The Stage Manager Web console also enables you to switch datacenters associated with Stage Manager.

For information about user credential requirements for connecting to VirtualCenter, see "Credential Requirements for Connecting Stage Manager to the VirtualCenter Server" on page 107.

To reconnect Stage Manager to the VirtualCenter Server after losing the connection

1 In the left pane of the console, click **Settings**.

2 Click the **VirtualCenter** tab.

3 To force a reconnect operation, click **OK**.

To change the port number for the VirtualCenter Server

1 In the left pane of the console, click **Settings**.

2 Click the **VirtualCenter** tab.

3 Enter the port number.

4 Click **OK**.

To change the VirtualCenter system

1 Unprepare all the hosts attached to Stage Manager.

See "Preparing and Unpreparing ESX Server Hosts" on page 76.

2 Detach all the resource pools attached to Stage Manager.

The resource pools can involve clusters and hosts. See "Attaching and Detaching Resource Pools" on page 73.

3 In the left pane of the console, click **Settings**.

4 In the **VirtualCenter** tab, provide connection details:

- VirtualCenter machine name or IP address
- VirtualCenter port number
- User name and password

5 Click **OK**.

6 In the left pane, click **Resources**.

7 Click the **Attach Resource Pool** button.

8 Select the resource pool associated with the new datacenter.

9 (Optional) Enter a different name for the resource pool in Stage Manager.

10 Click **OK**.

To change a datacenter

1 Unprepare all the hosts attached to Stage Manager.

See "Preparing and Unpreparing ESX Server Hosts" on page 76.

2 Detach all the resource pools attached to Stage Manager.

The resource pools can involve clusters and hosts. See "Attaching and Detaching Resource Pools" on page 73.

3 In the left pane, click **Resources**.

4 Click the **Attach Resource Pool** button.

5 Select the resource pool associated with the new datacenter.

6 (Optional) Enter a different name for the resource pool in Stage Manager.

7 Click **OK**.

Credential Requirements for Connecting Stage Manager to the VirtualCenter Server

To set up a connection with the VirtualCenter Server, Stage Manager requires a user who is part of a role in VirtualCenter with at least the privileges listed in Table 3-1. As with other roles in VirtualCenter, you can assign Windows users or VirtualCenter users to this role.

Stage Manager requires the user to have certain permissions on objects. Any change in the role of this user to another VirtualCenter role with fewer privileges hinders Stage Manager operations. For example, assigning the user to the **No Access** role in VirtualCenter for an object, such as a resource pool, blocks the visibility of this object in a Stage Manager environment. For information about roles and setting object permissions, see VMware Infrastructure 3 documentation at http://www.vmware.com/support/pubs/vi_pages/vi_pubs_35.html.

If you set up the Stage Manager connection to the VirtualCenter Server with VirtualCenter administrator credentials, you have the proper credentials to make this connection.

If you set up the Stage Manager connection to the VirtualCenter Server with user credentials that do not have VirtualCenter administrator privileges, complete these tasks:

- Set up a user role (for example, a **Stage_Manager_User** role) in VirtualCenter with the minimum privileges listed in Table 3-1.
- Add a Windows user on the VirtualCenter system to the role.
- In the **Permissions** tab of the VI Client, specify access permissions for the user to the root folder (**Hosts & Clusters** in the left pane of the VI Client) and the datacenter that works with Stage Manager. Propagate the permissions to all child objects in the datacenter.

  The VI client enables you to assign permissions for objects, such as a datacenter, cluster, host, and resource pool. Stage Manager can only work with one datacenter at a time.

The privileges in Table 3-1 appear in the **Edit Role** dialog box of the VI Client.

Table 3-1. Required Privileges for Connecting to the VirtualCenter Server

VI Client Privilege Category	Required Privileges
Global	■ Enable Methods ■ Disable Methods
Folder	■ Create Folder ■ Delete Folder ■ Rename Folder ■ Move Folder
Datastore	■ Browse Datastore ■ File Management
Network	■ Remove

Host	■ Inventory
	  ■ Modify Cluster
	■ Configuration
	  ■ System Management
	  ■ Network Configuration
	■ Local Operations
	  ■ Add host to VirtualCenter

Table 3-1. Required Privileges for Connecting to the VirtualCenter Server (Continued)

VI Client Privilege Category	Required Privileges
Virtual Machine	■ Inventory ■ Create ■ Move ■ Remove ■ Interaction Select all options. For example, select Power On, Power Off, and all other options. ■ Configuration Select all options. For example, select Rename, Add Existing Disk, and all other options. ■ Provisioning ■ Clone ■ Deploy Template ■ Clone Template ■ Read Customization Specifications ■ Modify Customization Specification ■ Allow Disk Access ■ Allow Read-only Disk Access ■ Allow Virtual MAchine Download ■ Allow Virtual Machine Files Upload
Resource	■ Assign Virtual Machine To Resource Pool ■ Apply Recommendation ■ Migrate ■ Relocate ■ Query VMotion

Performing Force Operations

When some standard operations fail, Stage Manager administrators can forcefully undeploy or delete certain objects.

Undeploying Templates with Force

If standard undeploy operations do not work, Stage Manager administrators can forcefully undeploy a template to clean the Stage Manager database. An example of this kind of situation is when an ESX Server host goes offline or someone manually removes a virtual machine from VirtualCenter inventory.

The **Force Undeploy** menu option is visible even when the **Undeploy**, **Undeploy - Save State**, or **Undeploy - Discard State** menu options are available. Although it is intended for special circumstances, the **Force Undeploy** menu option produces the same results as the **Undeploy - Discard State** menu option in standard circumstances.

To forcefully undeploy a template

1 From the left pane, click **VM Templates**.

2 Move the pointer over the deployed template name and choose **Force Undeploy** from the menu.

Undeploying Virtual Machines with Force

If standard undeploy operations do not work, Stage Manager administrators can forcefully undeploy a virtual machine to clean the Stage Manager database. An example of this kind of situation is when an ESX Server host goes offline or someone manually removes a virtual machine from VirtualCenter inventory. Service users cannot access this option.

The **Force Undeploy** menu option is visible even when the **Undeploy - Save State** and **Undeploy - Discard State** menu options (for a single virtual machine) and **Undeploy all VMs** menu option (for all virtual machines on a host) are available. Although it is intended for special circumstances, the **Force Undeploy** menu option produces the same results as the **Undeploy - Discard State** menu option (for a single virtual machine) in standard circumstances.

To forcefully undeploy an individual virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu. In the **Virtual Machines** tab, move the pointer over the virtual machine name and choose **Force Undeploy** from the menu.

To forcefully undeploy all virtual machines on a host

1 In the left pane, click **Resources**.

2 In the **Hosts** tab, move the pointer over the resource pool and choose **Force Undeploy** from the menu.

3 Confirm the operation.

Undeploying Configurations with Force

If standard undeploy operations do not work, Stage Manager administrators can forcefully undeploy a configuration to clean the Stage Manager database. An example of this kind of situation is when an ESX Server host goes offline or someone manually removes a virtual machine from VirtualCenter inventory. Service users cannot access this option.

The **Force Undeploy** menu option is visible even when the **Undeploy**, **Undeploy - Save State**, or **Undeploy - Discard State** menu options are available. Although it is intended for special circumstances, the **Force Undeploy** menu option produces the same results as the **Undeploy - Discard State** menu option in standard circumstances.

To forcefully undeploy a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Force Undeploy** from the menu.

Deleting Published Templates With Force After Host Failure

If a standard delete operation does not work for a published template, Stage Manager administrators can forcefully delete the template. An example of this kind of situation is when an ESX host failure prevents you from unpublishing the template.

The **Force Delete** menu option cleans the template from the Stage Manager database but not from the VirtualCenter inventory. You can manually remove the virtual machine from the VirtualCenter inventory.

To delete a published template

1 In the left pane, click **VM Templates**.

2 Move the pointer over the published template name and choose **Force Delete** from the menu.

3 Confirm the deletion.

Service User and Service Administrator Operations

Working with Services 4

Services are the business functions that IT provides to the company. For example, a service might be an internal company Web site or email service. Services in Stage Manager contain configurations, the applications that enable the service. These configurations reside in various stages of the service lifecycle.

This chapter includes these topics:

- "Accessing Services" on page 115
- "Reviewing Service Operations" on page 116

Accessing Services

Use the **Services** link in the left pane to access the Services page. Services are visible to Stage Manager administrators, service administrators assigned by Stage Manager administrators to particular services, and service users assigned by either Stage Manager administrators or service administrators to particular services.

Only Stage Manager administrators can set up a service template that serves as the default setup for all new services. See "Managing Services" on page 32.

On this page, a table presents this information:

- List of services under Stage Manager management that are visible depending on user roles.
- Number of stages that each service contains
- Number of deployed configurations and total number of configurations in the lifecycle.

- Number of configurations in the service archive
- Administrators for each service (different from the Stage Manager administrator who oversees the overall environment)

Use this page to create or delete a service. From the table, you can access lifecycle and properties information for a specific service. See "Reviewing Service Operations" on page 116.

Reviewing Service Operations

Operations for services range from accessing service and stage properties to changing the order of stages in a service.

Creating and deleting services is restricted to Stage Manager administrators. See "Managing Services" on page 32.

Editing Service Properties

Stage Manager administrators and service administrators can change service names, service descriptions, and user roles for a particular service.

This operation involves assigning user roles. See "Reviewing User Roles" on page 25.

To edit service properties

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Properties** from the menu.

3 Enter the name of a service and a description, if needed.

4 Assign users to roles.

From the list of available users, select the appropriate users and use the right and left arrows to assign them roles as service users or service administrators.

Although Stage Manager administrators have access to all services, you might still assign them specific roles for tracking purposes. For example, you can see users identified with service administrator access on the Services page.

5 Click **OK**.

Accessing the Lifecycle Stages of a Service

From the Services page, you can access the **Lifecycle** tab to work with stages of a service. You can view the stages (for example, **Stage 1: Development**) and configurations within each stage. For information about configuration operations from the **Lifecycle** tab, see "Accessing Configurations" on page 119.

Stages with a key icon indicate stages with restricted access. This restriction is set in the properties of a stage.

To access the lifecycle stages of a service

1 From the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

Editing Stages of a Service

Stage Manager administrators and service administrators can add, delete, or change the stage order for a service.

To edit stages

1 From the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Click the **Edit Stages** button and view the stages of the service, resource pool associated with each stage, deployed configurations, total number of configurations, deployed virtual machines, and total number of virtual machines.

4 To adjust the order of stages, move the pointer over a stage name and choose **Move up** or **Move** down from the menu.

5 To delete a stage, move the pointer over a stage name, choose **Delete** from the menu, and confirm the deletion.

   You can only delete empty stages. For information about deleting configurations in a stage, see "Deleting Configurations" on page 124.

6 To add a new stage, click **New Stage**:

   a Enter the name of the stage.

   b Specify whether to restrict stage access to Stage Manager administrators and service administrators.

      For example, you might want to prevent development or QA service users from accessing deliverables for production.

c Select a resource pool.

d Click **OK**.

The new stage appears as the first stage.

Editing Stage Properties

Stage Manager administrators and service administrators can change stage names, restrict user access, and assign resource pools.

To modify stage properties

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Click the **Edit Stages** button.

4 Move the pointer over a stage name and choose **Properties** from the menu.

5 Update the desired properties:

a Alter the name of the stage.

b Specify whether to restrict the stage to Stage Manager and service administrators.

For example, you might want to prevent development or QA users from accessing deliverables for production. The stage is still visible but disabled to service users.

c Alter the assigned resource pool.

d Click **OK**.

Working with Configurations 5

Configurations are the applications that enable a service. Each configuration contains one or more virtual machines. For example, a configuration for a Microsoft Exchange Server email service might include a virtual machine that provides hub transport and another virtual machine that provides client access.

Stage Manager can replicate these configurations on demand. For example, an IT team might have a service for order processing that include an "integration" stage prior to production. The team needs to easily duplicate a complex configuration at this stage because multiple IT users have to test several versions of the same configuration.

Use iterations of the same configuration in different stages to ultimately produce a production-ready configuration that enables the service.

This chapter includes these topics:

- "Accessing Configurations" on page 119
- "Performing Configuration Operations" on page 121

Accessing Configurations

You can access configurations in the **Lifecycle** and **Archive** tabs. Use the **Lifecycle** tab to create a new configuration and view the stages of a service. Use the **Archive** tab to preserve configurations in-state.

Accessing the Lifecycle Tab

The **Lifecycle** tab presents this information:

- Icons that provide access to virtual machine consoles.
- Configuration names with a pop-up menu to perform various operations
- Status on whether the configuration is deployed or in the midst of an operation.
- Specification of whether the configuration is running in fenced mode.
- Creator of the configuration.

  If a user is no longer registered as a Stage Manager user, the column displays **Unavailable**.
- Messages on potential conditions that could cause errors (for example, an action in VirtualCenter impacts the configuration in Stage Manager or a host becomes disconnected).

  These messages link to a **Messages** dialog box where you can clear the text.

From the table in this tab, you can access configuration properties and details on virtual machines and perform configuration operations. See "Performing Configuration Operations" on page 121.

To access configurations in the Lifecycle tab

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

Accessing the Archive Tab

The **Archive** tab presents this information:

- Console icons that provide access to virtual machines
- Configuration names with a pop-up menu to perform various operations
- Date and time when the archive operation took place.
- Time when Stage Manager will delete the configuration or mark the configuration for deletion. See "Reviewing the Resource Cleanup Tab" on page 103.
- Creator of the configuration.

From the table in this tab, you can access configuration properties and details on virtual machines and perform configuration operations. See "Performing Configuration Operations" on page 121.

To access configurations in the Archive tab

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Click the **Archive** tab.

Performing Configuration Operations

Configuration operations occur in the **Lifecycle** or **Archive** tabs.

If a particular operation appears in a configuration menu, the appearance indicates the state of one or more virtual machines in that configuration, as follows:

- If **Undeploy - Save State** or **Undeploy - Discard State** appears in a configuration menu, at least one virtual machine in the configuration is deployed.
- If **Deploy** appears in a configuration menu, at least one virtual machine in the configuration is undeployed.
- If **Power On** appears in a configuration menu, at least one virtual machine in the configuration is off.

Operations for a configuration might not affect all its virtual machines, as follows:

- If you start the **Power On** operation, virtual machines that are already turned on are unaffected.
- If you start the **Revert** operation, only the virtual machines that have a snapshot set are reverted.

Creating Configurations

Creating a configuration involves defining configuration properties and adding virtual machines to the configuration. You can add virtual machines based on Stage Manager templates.

This operation involves specifying a storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

Only Stage Manager administrators have access to an **Import VM from VirtualCenter** option when creating a configuration. See "Importing Virtual Machines from VirtualCenter to New and Existing Configurations" on page 61.

To create a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Click **New Configuration**.

4 Enter a name for the configuration.

5 (Optional) Enter a description of the configuration.

6 (Optional for DHCP IP address allocation) Change the networking information for the gateway, subnet mask, and DNS settings for the virtual machines.

The default networking values are the same values in the **General** tab of the Network page. Only Stage Manager administrators have access to this page.

7 Specify a time to delete the configuration or mark the configuration for deletion.

8 Select a stage.

9 Click the **Add Virtual Machine** button to add a virtual machine based on a template in the template library.

You only need to click the **Add Virtual Machine** button if you create more than one virtual machine based on a template. For a single virtual machine, the template information you need to fill out automatically appears. See Step 10.

If a known template does not appear in the list, verify that the Stage Manager administrator published the template.

10 Select the source template for the virtual machine.

11 Enter a name for the virtual machine.

Maximum length is 15 characters for Windows virtual machines and 64 characters for UNIX and Linux virtual machines.

12 Specify the IP address assignment.

Select **Static (manual)** to activate the **IP Address** text box. For information about IP address allocation, see "IP Address Assignment for Virtual Machines" on page 123 and "Using Static IP and DHCP Networking" on page 92.

13 Specify whether you want to make a full clone (rather than a linked clone) of the template.

For information about types of clones, see "Cloning Configurations" on page 129.

Select the **Full Clone** check box to activate the datastore list where you can select the storage location of the virtual machine. Linked clones remain on the same datastore as the original template.

14 Change the default values for boot parameters:

a Enter an integer number between zero and the total number of virtual machines indicating the boot sequence for the virtual machines.

You do not need to use sequential numbers. Stage Manager can determine the relative order.

If two virtual machines have the same number, Stage Manager does not apply a boot sequence.

b Enter an integer number indicating the delay in seconds (or "pause") between the power on process of this virtual machine and the next virtual machine.

For example, if you have a database server and a Web application, you might want to make sure the database server is powered on with all services running before powering on the Web application.

15 To add another virtual machine to this configuration, click the **Add Virtual Machine** button again.

During the creation of the initial configuration, you can add up to 20 virtual machines. To add virtual machines at a later time, see "Adding Virtual Machines to Existing Configurations" on page 141.

16 Click **OK**.

The new configuration appears in the first stage of a service.

IP Address Assignment for Virtual Machines

On the New Configuration page, entering an IP address changes the information that Stage Manager has about the machine but does not necessarily change the IP address configured on the machine. This situation depends on whether the template has guest customization enabled by the Stage Manager administrator.

For information about guest customization, see "Editing Advanced Template Properties" on page 56 and "Customizing Guest Operating Systems" on page 40.

Table 5-1 describes IP address entry scenarios.

Table 5-1. IP Address Entry Scenarios

IP Management	Template With Guest Customization	Template Without Guest Customization
Static (IP pool)	Stage Manager assigns the IP address internally and configures the virtual machine.	Stage Manager assigns the IP address internally, but you must manually configure the virtual machine: Navigate to the properties information for the virtual machine, note the assigned IP address, and manually configure the virtual machine IP address.
Static (manual)	Stage Manager takes the address that you enter, assigns it internally, and configures the virtual machine.	Stage Manager assigns the IP address that you enter, but you must manually configure the virtual machine IP address.
DHCP	Stage Manager configures the virtual machine to obtain its network settings from a DHCP server.	Stage Manager does not configure or assign an IP address. Manually configure the virtual machine.

Deleting Configurations

You can delete an undeployed configuration from the **Lifecycle** tab or **Archive** tab. For information about the undeploy operation, see "Undeploying Configurations" on page 135.

To delete a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

To access an archived configuration instead of a lifecycle configuration, click the **Archive** tab.

3 Move the pointer over the configuration name and choose **Delete** from the menu.

Deploying Configurations

Deploying a configuration registers virtual machines on ESX Server hosts and provides access to Stage Manager operations at the virtual machine console level. The hosts are associated with the resource pool assigned to a particular stage. For information about resource pools for stages, see "Editing Stage Properties" on page 118.

When you deploy a configuration, you can specify whether to deploy a configuration with network fencing. Fencing is an architecture that isolates or "fences" groups of virtual machines on the same network from other machines. Fencing allows you to use multiple copies of identical configurations simultaneously. Without fencing, this is usually not possible because of IP address or machine name conflicts.

Deploying a configuration in fenced mode places all the virtual machines on a single ESX Server host. You must have a host connected to the datastore where the templates that serve as the basis of this configuration reside. The host must have enough resources to pass VMware Infrastructure admission controls for virtual machines.

For more information about fencing, reasons for options, and consequences of deploying a fenced configuration after deploying it without fencing and saving its state, see Appendix C, "Network Fencing," on page 181.

When you initially deploy a configuration based on templates with guest customization enabled, the configuration goes through the customization process which involves multiple reboots based on whether the virtual machines use SIDgen or Microsoft® Sysprep. Do not shut down the virtual machines until the customization is complete. You can log in to the system and verify settings such as the computer name or network values. See "Customizing Guest Operating Systems" on page 40.

Deploying a configuration involves specifying a deployment lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To deploy a configuration with default preferences

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Deploy with defaults** from the menu.

Stage Manager deploys the configuration with deployment options from your user preferences and the virtual machine console icons for that configuration become active. See "Setting User Preferences" on page 25.

To deploy a configuration without default preferences

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Deploy** from the menu.

4 Specify whether to use a network architecture mode for deploying configurations:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.
- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

5 To boot virtual machines in the sequence specified during the creation of the configuration, select the **Use Server Boot Sequence** check box.

6 Deselect the **Power On Machines After Deployment** check box to prevent Stage Manager from powering on virtual machines immediately after deployment.

Use this option when you need to manually bring up virtual machines. For example, you might need to ensure a database, application and Web server are working individually rather than all at once.

7 Specify a time to undeploy the configuration.

Stage Manager allows you to renew a lease at a later time.

8 Click **OK**.

Deploying Configurations on High Availability Clusters

If you deploy a configuration on a cluster with VMware HA, Stage Manager uses the same calculation that VirtualCenter has for assessing free slots available in the cluster. After assessing that the hosts have enough resources, Stage Manager powers on the virtual machines. If the hosts do not meet compatibility requirements, the deploy operation fails and Stage Manager displays a message.

If you experience a failure, you need to reconfigure the resources. For information about resource management, see the *Resource Management Guide* for VMware Infrastructure 3.

The calculation that VirtualCenter and Stage Manager uses is conservative. If necessary, disable it in VirtualCenter to stop this calculation in Stage Manager.

To disable the calculation

1 Log in to the VMware Infrastructure Client.

2 Right-click the cluster and select **Edit Settings**.

3 In the left pane of the dialog box, select **VMware HA**.

4 In the **Admission Control** section of the dialog box, select **Allow virtual machines to be powered on even if they violate availability constraints**.

5 Click **OK**.

Undeploying Configurations

Undeploying a configuration unregisters its virtual machines from VirtualCenter. You can undeploy a configuration and save its state or undeploy a configuration and discard the state.

Saving the memory state helps you to debug memory-specific issues and makes virtual machines in the configuration ready for deployment and use almost instantly.

If an ESX Server host goes offline or someone manually removes a virtual machine from VirtualCenter inventory, the standard undeploy operation does not work. Stage Manger administrators can see "Undeploying Configurations with Force" on page 111.

To undeploy a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Undeploy - Save State** or **Undeploy - Discard State** from the menu.

Promoting and Demoting Configurations

You can promote a configuration to a later stage of the lifecycle. For example, you finish development in stage 1 and you need to start testing a configuration in stage 2. Depending on your user role, you can demote a configuration to either the previous stage or any earlier stage.

If you move a configuration into another stage that uses a different resource pool than the original stage, Stage Manager attempts to move the virtual machines of the configuration to the new resource pool. If the configuration is fenced, Stage Manager might not be able to move the virtual machines to the new resource pool. This occurs when the new resource pool is served by a different compute resource (cluster or

standalone host). In this situation, the promote or demote operation still occurs but a message appears in the **Lifecycle** tab noting that the configuration is in the wrong resource pool. Undeploying and redeploying the configuration allows Stage Manager to place the configuration in the correct resource pool.

For information about fenced configurations, see Appendix C, "Network Fencing," on page 181. For information about the **Lifecycle** tab, see "Accessing the Lifecycle Stages of a Service" on page 117.

To promote a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Promote** from the menu.

4 (Optional) Modify the default change summary.

This change summary can be helpful for auditing purposes and appears on the **History** tab. See "Accessing Change Summaries for Configurations" on page 140.

5 Click **OK**.

To demote a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Demote** from the menu.

4 If you are a Stage Manager administrator or service administrator, select the destination stage.

Service users can only demote a configuration to the previous stage.

5 (Optional) Modify the default change summary.

This summary can be helpful for auditing purposes and appears on the **History** tab. See "Accessing Change Summaries for Configurations" on page 140.

6 Click **OK**.

Cloning Configurations

Stage Manager allows you to create linked clones and full clones of an undeployed configuration.

A linked clone operation generates a "quick" copy by creating a delta disk instead of copying an entire virtual hard disk. This operation addresses virtual machine proliferation by using "referential provisioning," a process that involves storing new changes but referring back to a chain of delta disks. For each clone, Stage Manager freezes the original delta disk and creates a new one.

A full clone operation copies all of the delta disks and the base disk and consolidates them into a new base disk. The original base disk remains unchanged.

Typically, you do not create full clones except under these conditions:

- You need to dismantle the storage and move the configuration to a different server.
- You want to maximize performance for virtual machines (for example, for certain production-level virtual machines).

A full-clone operation takes a longer time than a linked-clone operation.

In a fenced configuration, virtual machines retain the same IP address within the fence. Stage Manager assigns new external IP addresses for communication outside the fence. Each time you deploy a fenced configuration, Stage Manager assigns new external IP addresses from the Stage Manager IP address pool. Stage Manager returns the IP addresses to the pool when the fenced configuration is undeployed. Stage Manager does not return the IP address of a linked clone to the IP pool until the virtual machine and all its copies are deleted.

When you create a either a linked or full clone, Stage Manager assigns the same network parameters to the cloned virtual machines. If you deploy the original and cloned configurations at the same time, duplicate IP address errors occur unless one of the configurations is deployed in fenced mode. For information about fencing, see Appendix C, "Network Fencing," on page 181. For information about the alternative to fencing for this situation, see "Changing IP Addresses" on page 161.

Some Stage Manager operations indirectly involve cloning. For example, archiving a configuration involves a cloning process. For more examples, see "Enabling Resources" on page 77.

This operation involves specifying a storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To clone a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

The configuration must be undeployed to clone it. See "Undeploying Configurations" on page 135.

3 Move the pointer over the configuration name and choose **Clone** from the menu.

4 Provide clone details:

- Name.
- (Optional) Description.
- Time to delete the configuration or mark the configuration for deletion.
- Full or linked clone. If you make a full clone, select the datastore for the clone.

5 Click **OK**.

Archiving Configurations

You can preserve the exact state of a configuration in the service archive. The archived configurations are read-only but you can export, delete, clone, and transfer them to other services.

Use a unique naming convention for your stored configurations that simplifies identification.

This operation involves specifying a storage lease and modifying a change summary. See "Reviewing the Resource Cleanup Tab" on page 103 and "Accessing Change Summaries for Configurations" on page 140.

To archive a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Archive** from the menu.

4 Provide archive details:

- Name.
- (Optional) Description.
- Full or linked clone. If you make a full clone, specify the datastore for the clone.

- Time to delete the configuration or mark the configuration for deletion.
- (Optional) Change summary.

  This summary can be helpful for auditing purposes and appears on the **History** tab.

5 Click **OK**.

Cloning Archived Configurations to a Stage

Configurations stored in the service archive are read-only. You can clone an archived configuration to a stage of the service where the configuration originated.

For information about types of clones, see "Cloning Configurations" on page 129.

This operation involves specifying a storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To clone an archived configuration to a stage

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Archive** from the menu.

4 Move the pointer over the configuration name and choose **Clone to Stage** from the menu.

5 Provide cloning details:

- Name.
- (Optional) Description.
- Stage to clone the configuration to.
- Full or linked clone. If you make a full clone, specify the datastore for the clone.
- Time to delete the configuration or mark the configuration for deletion.

6 Click **OK**.

Exporting and Importing Configurations

Use Stage Manager to export and import configurations. These copy operations can take an extended period of time for each virtual machine in the configuration. The time depends on the size of the virtual machine.

Exporting Configurations

From the **Lifecycle** and **Archive** tabs, you can export (copy) an undeployed configuration and all its virtual machine files to SMB share. This operation assumes that you enabled a shared folder with full control permissions at the share and file system level.

Export and import operations require an open SMB port on the ESX Server hosts. Although the installation of the Stage Manager software takes care of opening that port, be aware of this requirement in case someone closes the port after the installation. To check the port status, use the `esxcfg-firewall -q smbClient` command on each host.

To export a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the undeployed configuration name and choose **Export** from the menu.

If you need to export a configuration in the service archive rather than an active lifecycle configuration, click the **Archive** tab, move the pointer over the configuration name, and choose **Export** from the menu.

4 Provide configuration details:

- UNC name of the directory (relative to the Stage Manager Server system) where you want your configuration files stored. A sample path is `\\10.6.1.246\ExportConfigs`. Use English characters for the UNC path.
- User name and password for the export directory, if necessary.

5 Click **OK**.

Importing Configurations

You can import (copy) a configuration and all its virtual machine files from SMB share.

Export and import operations require an open SMB port on the ESX Server hosts. Although the installation of the Stage Manager software takes care of opening that port, be aware of this requirement in case someone closes the port after the installation. To check the port status, use the `esxcfg-firewall -q smbClient` command on each host.

This operation involves specifying a storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To import a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Click the **Import Configuration** button.

4 Provide the configuration location and credentials:

- UNC name of the directory (relative to the Stage Manager Server system) from where you want to import the configuration. A sample path is `\\10.6.1.246\ExportConfigs`. Use English characters for the UNC path.
- User name and password for the import directory.

5 Click **Next**.

6 Provide configuration details:

- Name
- (Optional) Description
- Time to delete the configuration or mark the configuration for deletion
- Destination datastore

7 Click **Import**.

Transferring Configurations to Other Services

From the **Lifecycle** and **Archive** tabs, you can transfer a configuration from one service to another service. The transfer process can involve either a move or copy operation.

For information about types of clones, see "Cloning Configurations" on page 129.

This operation involves specifying a storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To transfer a configuration to another service

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Transfer to Service** from the menu.

To transfer a configuration in the service archive rather than a lifecycle configuration, click the **Archive** tab, move the pointer over the configuration name, and choose **Transfer to Service** from the menu.

4 Provide transfer details:

- Name.
- (Optional) Description.
- Move or copy operation to the first stage of a service. Moving a configuration deletes the configuration in the original service.
- Service to transfer the configuration to.
- Full clone or linked clone, depending on whether you selected the option to copy the configuration.
- Destination datastore for a full clone.
- Time to delete the configuration or mark the configuration for deletion.

5 Click **OK**.

Taking Snapshots and Reverting to Snapshots

After deploying a configuration, you can take a snapshot and revert to the snapshot at a later time. A snapshot captures a complete configuration (including all its virtual machines) at a specific point in time. Stage Manager stores the snapshot with the configuration.

Only one snapshot for a configuration is active at a time. The most recent snapshot replaces the previous one.

A snapshot might be useful as a baseline or "clean slate" that you can return to when running a number of tests on the same configuration.

To take a snapshot of a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Snapshot** from the menu.

The configuration status displays **Setting the Revert Point**. After a brief time, the configuration returns to its previous state.

To revert a configuration to its snapshot

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Revert** from the menu.

The status of the configuration appears as **Reverting**. Stage Manager updates the thumbnail icons for the virtual machines to reflect the revert point state.

Stopping Configurations

You can stop configurations from running using the undeploy, suspend, and power off operations.

Undeploying Configurations

Undeploying a configuration unregisters virtual machines from VirtualCenter. See "Undeploying Configurations" on page 127.

Suspending Configurations

Suspending a deployed configuration "freezes" the CPU of the virtual machines. The virtual machines remain registered with VirtualCenter.

To suspend a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Suspend** from the menu.

Resuming the Operation of Suspended Configurations

Use the **Resume** option to reverse a suspended state.

To resume operation of a suspended configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Resume** from the menu.

Powering Off Configurations

Powering off a deployed configuration turns the virtual machines off and is the virtual equivalent of powering down a physical machine. The virtual machines remain registered with VirtualCenter.

To power off a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Power Off** from the menu.

Powering On Configurations

Powering on a deployed configuration turns the virtual machines on and is the virtual equivalent of powering on a physical machine.

To power on a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Power On** from the menu.

Resetting Configurations

Resetting a configuration restarts the virtual machines in a configuration and clears the machine states. This operation does not shut down the guest operating systems.

To reset a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Reset** from the menu.

Consolidating Configurations

Each time you create a linked clone of a configuration, Stage Manager freezes the virtual hard disk associated with the original virtual machines and creates delta disks to store future changes to the clone and its source. Over time, the increasing number of delta disks stored across the directories of a datastore can affect performance. You do not need to consolidate configurations until Stage Manager generates an error message requesting this operation.

NOTE Even if you do not have to consolidate disks, you can use this operation to move a configuration to a different datastore.

Consolidating a configuration can take an extended period of time depending on the disk size and storage performance. Consolidation reduces the free space on datastores because the configuration no longer benefits from delta disks.

To consolidate a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

The configuration must be undeployed to consolidate it. See "Undeploying Configurations" on page 127.

3 Move the pointer over the undeployed configuration name and choose **Consolidate** from the menu.

4 Select a destination datastore.

5 Click **OK**.

Editing Configuration Properties

From the **Lifecycle** and **Archive** tabs, you can update the configuration parameters.

This operation involves specifying deployment or storage lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To edit configuration properties

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

To access details on an archived configuration instead of an active lifecycle configuration, click the **Archive** tab.

3 Move the pointer over the configuration name and choose **Properties** from the menu.

4 Update or review the general information and parameters:

- General settings:
  - Name
  - Description
  - Deployment or storage lease time
- Networking settings:
  - Gateway
  - Subnet mask
  - DNS information

  Use these values to override the default network values that the Stage Administrator sets in "Configuring Network Settings" on page 90.
- Existing messages

5 Click **OK**.

Accessing Details on Virtual Machines in a Configuration

From the **Lifecycle** and **Archive** tabs, you can navigate to details about each virtual machine in a configuration. The information ranges from deployment status to the internal or external IP addresses for the virtual machines.

For configurations accessible from the **Lifecycle** tab, you can use the **Virtual Machines** tab to add a virtual machine to a configuration based on a Stage Manager template, import a virtual machine to a configuration from VirtualCenter, or access configuration properties. From the table in the **Virtual Machines** tab, you can move the pointer over the virtual machine name and perform many of the same operations, such as deploy, consolidate, and add a virtual machine to the template library, available from the pop-up menu in a virtual machine console. For information about those operations, see "Performing Virtual Machine Operations" on page 144.

For configurations accessible from the **Archive** tab, you can use the **Virtual Machines** tab to access configuration properties. From the table in the **Virtual Machines** tab, you can perform operations such as consolidate a virtual machine.

To access details on virtual machines in a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

To access details on an archived configuration instead of an active lifecycle configuration, click the **Archive** tab.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 In the **Virtual Machines** tab, review this information:

- Console icons that provide access to virtual machines.
- Name of the virtual machine.
- Status (for example, deployed or undeployed).
- (Not applicable to archived configurations) Name of the resource pool and host.
- IP address of the virtual machine.

  If the virtual machine uses DHCP IP address allocation, **DHCP** appears in the **IP Address** column.
- (Not applicable to archived configurations) External IP address for the virtual machine if it runs in fenced mode. See Appendix C, "Network Fencing," on page 181.

- Template upon which the virtual machine is based.
- (Not applicable to archived configurations) Priority for shares of CPU.
- (Not applicable to archived configurations) Priority for shares of memory.
- Delay time (in seconds) after booting this machine and before booting the next machine.
- Order to power on the virtual machines.

  If the virtual machine has the same number as another virtual machine in the configuration, Stage Manager does not apply a boot order.
- (Not applicable to archived configurations) Messages.

Accessing Change Summaries for Configurations

From the **Lifecycle** and **Archive** tabs, you can navigate to change summaries for configurations. The change summaries are helpful for tracking and auditing purposes.

To access change summaries for configurations

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

  To access details on an archived configuration instead of an active lifecycle configuration, click the **Archive** tab.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 In the **History** tab, review this information:

- Action that took place (for example, promoting a configuration).
- Change summary. Promote, demote, and archive operations allow for default or user-input comments while cloning, cloning to stage, and transferring to service operations involve automated summaries.
- User who performed the action.
- Date of the action.

Adding Virtual Machines to Existing Configurations

From the **Virtual Machines** tab of a configuration, you can add virtual machines based on Stage Manager templates.

Only Stage Manager administrators have access to an **Import VM from VirtualCenter** option when adding virtual machines to a configuration. See "Importing Virtual Machines from VirtualCenter to New and Existing Configurations" on page 61.

To add a virtual machine based on a Stage Manager template

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

If you want to access details on an archived configuration instead of an active lifecycle configuration, click the **Archive** tab.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Click the **Add Virtual Machine** button.

5 Provide virtual machine details:

- Name that contains alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 15 characters for Windows virtual machines and 64 characters for UNIX and Linux virtual machines.
- (Optional) Description.
- Template to base the virtual machine on. If a known template does not appear in the list, verify that the Stage Manager administrator published the template.
- Full or linked clone of the template. The **Full Clone** check box activates the datastore list where you can select the storage location of the virtual machine. Linked clones remain on the same datastore as the original template. See "Cloning Configurations" on page 129.
- IP address assignment. **Static (manual)** activates the **IP Address** text box. See "IP Address Assignment for Virtual Machines" on page 123 and "Using Static IP and DHCP Networking" on page 92.
- Gateway, subnet mask, and DNS settings. The default values are the values on the **General** tab of the Network page. Only Stage Manager administrators can access this page. See "Configuring Network Settings" on page 90.

- Boot parameters:
  - Integer number between zero and the total number of virtual machines indicating the boot sequence for the virtual machines.

    You do not need to use sequential numbers. Stage Manager can determine the relative order.

    If two virtual machines have the same number, Stage Manager does not apply a boot sequence.
  - Integer number indicating the delay in seconds (or "pause") between the power on process of this virtual machine and the next virtual machine.

    For example, if you have a database server and a Web application, you might want to make sure the database server is powered on with all services running before powering on the Web application.

6 Click **OK**.

Accessing Consoles for Virtual Machines

Most operations for a configuration affect all the virtual machines in the configuration. To initiate an operation for a single virtual machine, navigate to the individual machine console to specify an operation.

See Chapter 6, "Working with Virtual Machines," on page 143, for information about accessing virtual machine consoles and operations.

Working with Virtual Machines

6

Virtual machines are the components of Stage Manager configurations. A host server can run multiple virtual machines concurrently and isolate each virtual machine in a self-contained environment.

Virtual machines are based on template images that contain guest operating systems, application servers, databases, directory servers, and other infrastructures used in IT deliverables. Only Stage Manager administrators can access and work with templates. For information about managing templates, see "Managing Virtual Machine Templates" on page 34.

This chapter includes these topics:

- "Accessing Virtual Machines" on page 143
- "Performing Virtual Machine Operations" on page 144

Accessing Virtual Machines

You can access virtual machines using the **Lifecycle** tab of a service or **Virtual Machines** tab of a configuration. For information about the **Virtual Machines** tab, see "Accessing Details on Virtual Machines in a Configuration" on page 139.

From a virtual machine console, you can perform operations ranging from installation of VMware Tools to media file activity for the guest operating system to snapshots of virtual machines. See "Performing Virtual Machine Operations" on page 144.

If you set up the Stage Manager Web console to appear with default page headers, you can view internal and external IP addresses of fenced virtual machines in the upper-left corner of the page. If you take a snapshot, a revert point displays a thumbnail icon of the last snapshot point in the upper-right corner of the page.

The **Configuration** pop-up menu near the upper-left corner provides access other virtual machines in the same configuration. Click a thumbnail icon to see the console display, or click **All Consoles** to see all virtual machine consoles in a configuration. Click **Configuration** to view the details of virtual machines in the configuration.

The virtual machine console page provides access to Ctrl+Alt+Del functionality (same as the functionality on a physical machine) and tools to set up a Remote Desktop Connection for a Windows virtual machine.

To access an individual virtual machine in a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Click in the console to work with the guest operating system.

To access all virtual machines in a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the deployed configuration name and choose **Show Consoles** from the menu.

4 Click in the console to work with the guest operating system.

If the VMware Tools utility is not installed in a virtual machine, you can "lose the mouse" when navigating into and out of the console window. Press Ctrl+Alt to fix the problem

Performing Virtual Machine Operations

Operations at the virtual machine level are available in both **Lifecycle** and **Archive** configurations. The options in the pop-up menu for a virtual machine are contingent upon its state. Operations on individual virtual machines affect the pop-up menu options for configurations.

Although most of the procedures in this section instruct you to access deployed virtual machine from the **Lifecycle** tab of a service, you can also access virtual machines from the **Virtual Machines** tab of a configuration. See "Accessing Details on Virtual Machines in a Configuration" on page 139.

Accessing a Virtual Machine Console for the First Time

When you initially deploy a template or configuration to access a virtual machine console, you must follow the instructions to install the ActiveX control.

When you initially access an individual virtual machine console page using Firefox, a message notes that you must install the VMware Remote MKS Plug-in to use the console.

To install the VMware Remote MKS Plug-in

1 Click **Install Plugin**.

2 Click the **Edit Options** button in the upper-right corner.

3 Click **Allow** and click **Close**.

4 In the virtual console, click **Install Plugin**.

5 Click **Install Now**.

6 Close the dialog box and click the refresh button in the Stage Manager page.

For some versions of Firefox, you might have to restart the browser.

Changing the Virtual Machine Console Display Size

You can change the size of a Windows virtual machine console as you would for a physical machine.

To change a virtual machine console size

1 From the virtual machine console, open the Control Panel.

2 Double-click **Display**.

3 From the **Settings** tab, move the screen resolution slider bar to a new display size.

4 Click **OK**.

Deploying Virtual Machines

Deploying a virtual machine registers it with a resource pool and provides access to Stage Manager operations at the virtual machine console level.

This operation involves specifying a deployment lease. See "Reviewing the Resource Cleanup Tab" on page 103.

To deploy a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 In the **Virtual Machines** tab, move the pointer over the virtual machine name and choose **Deploy** from the menu.

If all of the virtual machines in the configuration are undeployed, proceed to Step 5 for specific deployment options. Otherwise, Stage Manager deploys the virtual machine.

5 Specify whether to use a network architecture mode for deploying configurations:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration.
- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence, and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.
- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration.

If the configuration that the virtual machine belongs to uses DHCP, fencing options are disabled. See Appendix C, "Network Fencing," on page 181 for information about choosing a mode.

6 To boot the virtual machine in the sequence specified during the creation of the configuration, select the **Use Server Boot Sequence** check box.

7 To prevent Stage Manager from turning on virtual machines immediately after deployment, deselect the **Power On Machines After Deployment** check box.

Use this option when you need to manually bring up virtual machines. For example, you might need to ensure a database, application, and Web server are working individually rather than all at once.

8 Specify a time to undeploy the virtual machine.

A lease can be renewed at a later time.

9 Click **OK**.

Deploying Virtual Machines on High Availability Clusters

If you deploy a virtual machine on a cluster with VMware HA, Stage Manager uses the same calculation that VirtualCenter has for assessing free slots available in the cluster. After assessing that the hosts have enough resources, Stage Manager powers on the virtual machines. If the hosts do not meet compatibility requirements, the deploy operation fails and Stage Manager displays a message.

If you experience a failure, you need to reconfigure the resources. For information about resource management, see the *Resource Management Guide* for VMware Infrastructure 3.

The calculation that VirtualCenter and Stage Manager uses is conservative. If necessary, disable it in VirtualCenter to stop this calculation in Stage Manager.

To disable the calculation

1 Log in to the VMware Infrastructure Client (VI Client).

2 Right-click the cluster and select **Edit Settings**.

3 In the left pane of the dialog box, select **VMware HA**.

4 In the **Admission Control** section of the dialog box, select **Allow virtual machines to be powered on even if they violate availability constraints**.

5 Click **OK**.

Undeploying Virtual Machines

Undeploying a virtual machine unregisters it from VirtualCenter. You can undeploy a virtual machine and save its state or undeploy a virtual machine and discard the state.

Saving the memory state of virtual machines helps you to debug memory-specific issues and makes virtual machines ready for deployment and use almost instantly.

If an ESX Server host goes offline or someone manually removes a virtual machine from VirtualCenter inventory, the standard undeploy operation does not work. See "Undeploying Virtual Machines with Force" on page 110.

To undeploy a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Undeploy - Save State** or **Undeploy - Discard State** from the menu. For virtual machines that are powered off, you can only choose **Undeploy** because no state information is available to save or discard.

Setting Up Remote Desktop Connections

(Not applicable to virtual machine templates) From a virtual machine console page, you can remotely connect to a virtual machine configuration. Use the **Remote Desktop** option to connect to the virtual machine from any location. The following requirements apply:

- The virtual machine must be running the Windows operating system.
- You must have network access.
- You must have access permission as a Stage Manager administrator or an authorized remote-access user.
- The virtual machine must have a static IP address.

To set up a remote desktop connection to a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 From inside the virtual machine console, open the Control Panel.

5 Depending on the Windows operating system, enable the remote desktop by installing Terminal Services or by navigating to the **Remote** tab of the System Properties dialog box.

6 From the Stage Manager page with the virtual machine console, select **Remote Desktop** from the **Remoting Tools** list and complete the instructions.

Executing the Ctrl+Alt+Del Operation

From a virtual machine console page, you can perform a Ctrl+Alt+Del operation on the virtual machine.

To execute the Ctrl+Alt+Del operation

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine console tab and choose **Ctrl+Alt+Delete** from the menu.

Powering Off Virtual Machines

Powering off a virtual machine is the equivalent of powering off a physical machine.

To power off a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Power Off** from the menu.

Powering On Virtual Machines

Powering on a virtual machine is the equivalent of powering on a physical machine.

To power on a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Power On** from the menu.

Resetting Virtual Machines

Resetting a virtual machine restarts it and clears the machine state. This operation does not shut down the guest operating system.

If a boot image is not available in peripheral storage, the virtual machine boots off the virtual hard disk.

To reset a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Reset** from the menu.

Shutting Down Virtual Machines

Use the virtual machine console to shut down the guest operating system. This produces the same results as shutting down the operating system from within the guest.

This operation does not appear unless VMware Tools is installed and the virtual machine is booted. If you cannot see this operation after meeting these conditions, refresh the page.

If you still cannot see this operation, you might be using an old version of VMware Tools. In this case, uninstall the existing version and install VMware Tools in Stage Manager. See "Installing VMware Tools and Performing Guest Customization" on page 151.

To shut down a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Shut Down** from the menu.

Suspending Virtual Machines

Suspending a deployed virtual machine freezes the CPU of the virtual machines. The virtual machine remains registered with VirtualCenter.

For example, suspend a machine when you need to step away from this environment but you do not want to lose the current state.

To suspend a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Suspend** from the menu.

Resuming the Operation of Suspended Virtual Machines

Use the **Resume** operation to reverse a suspended state.

To resume operation of a suspended virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Resume** from the menu.

Installing VMware Tools and Performing Guest Customization

Install the VMware Tools utility in the guest operating system. This utility supports shared folders and cut and paste operations between the guest operating system and the machine from which you launch the Stage Manager Web console. VMware Tools improves mouse performance in some guest operating systems and graphic performance.

Installing VMware Tools allows you to move the pointer in to and out of the virtual machine console window. Prior to installing VMware Tools, you can "lose the mouse" when navigating into and out of the console window. Press Ctrl+Alt to fix the problem.

Stage Manager depends on the VMware Tools utility for customizing the guest operating system. For information about guest customization (available only at template level), see "Customizing Guest Operating Systems" on page 40.

To install VMware Tools

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Install VMware Tools** from the menu.

5 Log in to the guest operating system inside the virtual machine console.

6 Click **Install VMware Tools**.

Installing VMware Tools takes several minutes and requires you to restart the virtual machine. For more information about the installation, see VMware Infrastructure 3 documentation.

Taking Snapshots and Reverting to Snapshots

After deploying a virtual machine, you can take a snapshot and revert the virtual machine to that snapshot at a later time.

The snapshot is a captured virtual machine state at a specific point in time. Stage Manager stores snapshots persistently with the virtual machine image. If you undeploy a virtual machine and deploy it, the snapshot remains.

Only one snapshot for a virtual machine is active at a time.

To take a virtual machine snapshot

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Snapshot** from the menu.

Stage Manager turns off the virtual machine for a short time and then displays the console. A thumbnail icon of the snapshot display appears in the top-right corner of the page.

To revert to a snapshot

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Revert** from the menu.

Reverting to the last snapshot of the machine loses the current state of the machine. If you perform the operation from the virtual machine console, Stage Manager turns off the virtual machine for a short time and then displays the console. The thumbnail icon of the snapshot appears in the upper-right corner of the page. After the virtual machine reverts to the last snapshot, the display matches the **Revert Point** thumbnail icon.

Inserting CDs

You can upload data (for example, drivers) to a virtual machine from the Stage Manager media library. During the **Insert CD** operation, you can access the ISO images in the media library.

Only Stage Manager administrators can manage the media library. See "Managing Media" on page 63.

To insert a CD into a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Insert CD** from the menu.

5 Select an ISO file from the Stage Manager media library.

6 Click **OK**.

The **Eject CD** and **Swap CD** options replace the **Insert CD** option.

Ejecting and Swapping CDs

You can eject a CD or swap an inserted CD with another CD.

To eject a CD from a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Eject CD** from the menu.

To swap an inserted CD with another CD

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Swap CD** from the menu.

Inserting Floppy Disks

You can upload data (for example, drivers) to a virtual machine from the Stage Manager media library. During the **Insert Floppy** operation, you can access the floppy files in the media library.

For more information about media and floppy file names, see "Managing Media" on page 63.

To insert a floppy disk into a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Insert Floppy** from the menu.

5 Select a floppy file from the media library.

6 Click **OK**.

The **Eject Floppy** and **Swap Floppy** options replace the **Insert Floppy** option.

Ejecting and Swapping Floppy Disks

You can eject a floppy file or swap an inserted floppy file with another floppy file.

To eject a floppy disk from a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Eject Floppy** from the menu.

To swap an inserted floppy disk with another floppy disk

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 In the **Stage** column of the **Lifecycle** tab, click the thumbnail icon of the deployed virtual machine.

4 Move the pointer over the virtual machine name and choose **Swap Floppy** from the menu.

Consolidating Virtual Machines

Each time you create a linked clone of a virtual machine, Stage Manager freezes the virtual hard disk associated with the original virtual machine and creates delta disks to store future changes to the clone and its source. Over time, the increasing number of delta disks stored across the directories of a datastore can affect performance. You do not need to consolidate virtual machines until Stage Manager generates an error requesting this operation.

NOTE Even if you do not have to consolidate disks, you can use this operation to move a virtual machine to a different datastore.

Consolidating a virtual machine and can take an extended period of time (under or over 30 minutes), depending on the disk size and storage performance. Consolidation reduces the free space on datastores because the virtual machine no longer benefits from delta disks.

For information about how Stage Manager administrators can consolidate a virtual machine from the resource management area of the Web console, see "Consolidating Virtual Machines After Assessing Datastore Usage" on page 87.

To consolidate a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

The **Virtual Machines** tab displays the virtual machines in the configuration.

4 If the virtual machine is deployed, move the pointer over the virtual machine name and choose **Undeploy - Save State** or **Undeploy - Discard State** from the menu.

5 Move the pointer over the virtual machine name and choose **Consolidate** from the menu.

6 Select a datastore for the virtual machine.

7 Click **OK**.

Editing Basic Virtual Machine Properties

You can update the basic properties of a virtual machine. To update virtual machine properties from the administration area of the Web console, see "Editing Template and Virtual Machine Properties After Assessing Datastore Usage" on page 88.

This process involves specifying deployment or storage leases. See "Reviewing the Resource Cleanup Tab" on page 103.

For information about CPU priority, memory priority, and enabling a host to provide 64-bit support, see VMware Infrastructure 3 documentation.

To edit basic virtual machine properties

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

5 Review or edit the appropriate properties:

- **Name** – Virtual machine name that contains only alphanumeric characters (a–z, A–Z, 0–9), hyphens, underscores, or periods. Maximum length is 15 characters for Windows virtual machines and 64 characters for UNIX and Linux virtual machines.
- **Description** – (Optional) Maximum number of characters is 128.
- **Service** – Service containing the virtual machine.
- **Stage** – Stage of the service containing the virtual machine.
- **Template** – Template that the virtual machine is based on.
- **Datastore** – Storage location of the virtual machine.
- **Guest OS** – Guest operating system of the virtual machine. You must undeploy a virtual machine before editing this field.

  If you select a 64-bit guest operating system, the datastore must be connected to an ESX Server host that provides the required 64-bit processor for that guest OS. You can proceed without fulfilling this requirement but you cannot deploy the virtual machine until you attach a host with the correct processor. If you have some but not all 64-bit hosts, Stage Manager limits the number of hosts on which the virtual machine can be deployed.

- **IP Address** – Internal IP address that Stage Manager configures for the virtual machine. You must undeploy a virtual machine before editing this field.

  Editing the IP address does not change the IP address for the virtual machine. The editing process affects only the IP address that Stage Manager configured internally for the machine. See "Changing IP Addresses" on page 161.

- **Number of Virtual CPUs** – Maximum number of processors is four.

  The datastore for a virtual machine must be connected to a host that provides the required SMP technology for the guest operating system. If you choose a CPU number not currently compatible with the CPU of the host, you cannot deploy the virtual machine until you attach a host with the appropriate SMP support. If you have some but not all hosts that provide the required SMP technology, Stage Manager limits the number of hosts on which the virtual machine can be deployed.

- **Memory** – Amount of RAM allocated for running the virtual machine.

- **Hard Disks** – Disk name, disk space, and bus type for each virtual hard disk.

  You can add, edit, or remove a new virtual hard disk. See "Adding Virtual Hard Disks to Virtual Machines" on page 162 and "Editing Hard Disks" on page 163.

- **Resource Pool** – Resource pool associated with the virtual machine.
- **Host** – ESX Server host associated with the virtual machine.
- **CPU Priority** – Priority for shares of CPU.
- **Memory Priority** – Priority for shares of memory.
- **Boot Sequence** – Integer number between zero and the total number of virtual machines indicating the boot sequence for the virtual machines.

  You do not need to use sequential numbers. Stage Manager can determine the relative order.

  If two virtual machines have the same number, Stage Manager does not apply a boot sequence.

- **Wait After Power On** – Integer number indicating the delay in seconds (or "pause") between the power on process of this virtual machine and the next virtual machine.

  For example, if you have a database server and a Web application, you might want to make sure the database server is powered on with all services running before powering on the Web application.

- **Deployment Lease** or **Storage Lease** – Time to undeploy the template or delete the virtual machine (or mark it for deletion). The lease type that appears depends on whether the virtual machine is deployed or not.
- **System Messages** – Information about the virtual machine.

6 Click **OK**.

Editing Advanced Virtual Machine Properties

You can update advanced settings such as CPU and memory parameters and view information on VMware Tools and guest customization. For information about supported versions of VMware Tools, see "Prerequisites for Guest Customization" on page 41.

For information about CPU and memory settings, see VMware Infrastructure 3 documentation.

To edit advanced virtual machine properties

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

5 Click **Advanced Properties**.

6 Update the CPU settings:

- **CPU Priority**– Priority for shares of CPU.
- **CPU Reservation** – Minimum amount of CPU set aside for the virtual machine.
- **CPU Limit** – Maximum amount of CPU available for the virtual machine.
- **Use 32-bit Virtual CPU (Override the Host CPU Type)** – By default, the virtual CPU type assumes the physical host CPU type.

  Select this check box to override the default behavior and ensure the virtual CPU type is 32-bit. For example, you might have a virtual machine with a 32-bit guest operating system that does not have the requires software (kernel or drivers) to run on a 64-bit processor. Another example involves a mixed (32-bit and 64-bit) ESX host environment where you need to complete a testing process specifically on a 32-bit guest operating system and that operating system accommodates both 32-bit and 64-bit CPU architecture.

7 Update the memory settings:

- **Memory Priority** – Priority for shares of memory.
- **Memory Reservation** – Minimum amount of memory set aside for the virtual machine.
- **Memory Limit** – Maximum amount of memory available for the virtual machine.

8 View the virtual machine tool and customization settings set at the template level:

- **VMware Tools Installed** – Status of whether VMware Tools is installed or not.

  If **Unknown (Must deploy to determine)** appears, deploy the virtual machine and check this value again.

- **VMware Tools Internal Version** – Version of VMware Tools installed on the template.

  If VMware Tools is not installed, **Not Applicable** appears.

  For VMware Support cases, a VMware representative might request this version.

- **Supports Customization** – Specification of whether the installed version of VMware Tools supports guest customization in Stage Manager.

  If the value of the VMware Tools Internal Version field is less than 7299, you cannot make use of guest customization unless you install a supported version of VMware Tools.

- **Perform Customization When Adding to Configuration** – Specification of whether guest customization is disabled.

- **SID Mechanism** – Specification of the tool Stage Manager uses to change the SID.

  This entry appears only if the guest operating system supports both Microsoft Sysprep and SIDgen, and the Stage Manager administrator created a package with Microsoft Sysprep for guest customization.

  Only Stage Manager administrators can change this mechanism at the template level.

- **Use Time Synchronization** – Option that enables time synchronization between the guest (virtual machine) and ESX Server host operating systems. You must install VMware Tools to use this option.

  This option sets the value of `tools.syncTime` in the `.vmx` file.

9 View the remaining virtual machine settings:

- **VM Chain Length** – Number of delta disks generated by certain operations. For each change, Stage Manager freezes the original delta disk and creates a new one. Stage Manager generates an error to notify you when you need to consolidate the chain.

- **VM Directory ID** – Virtual machine location on the file system.

- **MAC Address** – If the template is undeployed, the **Reset MAC Address** button enables you to change the MAC address. See "Changing IP Addresses" on page 161.

10 Click **OK**.

Changing MAC Addresses

You can change a MAC address for an undeployed virtual machine after adding the virtual machine to a configuration.

You might change a MAC address if you have a MAC conflict or if you need to discard saved state quickly and easily.

To change the MAC address for a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

5 Click **Advanced Properties**.

6 Click **Reset MAC Address**.

You cannot specify your own MAC address.

7 Click **OK**.

Changing IP Addresses

You can change an IP address for an undeployed virtual machine after adding the virtual machine to a configuration.

To change the IP address of a virtual machine in a configuration

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

5 Enter a new IP address.

6 Click **OK**.

7 In the **Virtual Machines** tab, move the pointer over the virtual machine name and choose **Deploy** from the menu.

When you deploy the virtual machine, an error message might appear about a duplicate IP address because only Stage Manager is aware of the new IP address. If this error message appears, click **No**.

8 Navigate to the virtual machine console.

9 From inside the virtual machine console, manually change the IP address of the virtual machine as appropriate for your operating system.

- For Windows machines:
  - i From the virtual machine console, open the Control Panel.
  - ii Navigate to the Local Area Connection (LAN) window through the Network Connections window.
  - iii Click **Properties**.
  - iv From the **General** tab, select the **Internet Protocol (TCP/IP)** check box and click **Properties**.
  - v Click **Use the following IP address**, and enter the new IP address.
  - vi Close all windows.
- For Linux machines:
  - i Log in as `root`.
  - ii Use the `ifconfig –a` command to retrieve the IP address of the machine and the name of the Ethernet Card Identifier.
  - iii Use the `ifconfig` command to change the IP address:

    ```
    ifconfig <interface> <new IP address> netmask <netmask>
    ```

    Refer to this example:

    ```
    ifconfig eth0 10.10.10.10 netmask 255.255.0.0
    ```

Adding Virtual Hard Disks to Virtual Machines

You can add one or more virtual hard disks (`.vhd`) for an undeployed virtual machine.

To add virtual hard disks

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

4 Move the pointer over the virtual machine name and choose **Properties** from the menu.

5 Click **Add Hard Disk**.

6 Enter the disk information:

   a Specify whether the bus type is BusLogic SCSI or LSI Logic SCSI.

   b Review these details on the bus number, bus ID, and disk size:

   - If bus numbers are not available, **None** appears in the **Bus Number** list.
   - Bus ID #7 is reserved for a SCSI adapter.
   - If a bus is completely used, the **Bus ID** list appears as an empty list.
   - Disk size is limited by the space available for datastores.

7 Click **OK**.

   The new hard disk appears in the properties information section.

Adding SCSI Virtual Hard Disks

If you add a SCSI hard disk to a virtual machine, you might generate an operating system error message about missing drivers for this device.

If this error occurs, download and install the appropriate driver, and contact VMware for further support.

Editing Hard Disks

You can update the bus number and bus ID of a hard disk. See "Editing Basic Virtual Machine Properties" on page 156.

Review this information:

- If bus numbers are not available, **None** appears in the Bus Number list.
- Bus ID #7 is reserved for a SCSI adapter.
- If a bus is completely used, the Bus ID list appears as an empty list.

To make these changes instead in VirtualCenter, see VMware Infrastructure 3 documentation.

Deleting Virtual Machines

You can delete undeployed virtual machines. To delete a virtual machine from the resource administration area of the Web console, see "Deleting Virtual Machines and Configurations After Assessing Datastore Usage" on page 88.

To delete a virtual machine

1 In the left pane, click **Services**.

2 Move the pointer over the service name and choose **Details** from the menu.

3 Move the pointer over the configuration name and choose **Details** from the menu.

A virtual machine must be undeployed to delete it. See "Undeploying Virtual Machines" on page 147.

4 Move the pointer over the virtual machine name and choose **Delete** from the menu.

7 Monitoring Stage Manager

Use the Stage Manager Web console to view system statistics, resource usage, activity logs, and details on deployed virtual machines.

This chapter includes these topics:

- "Monitoring the Dashboard" on page 165
- "Monitoring the Activity Log" on page 166
- "Monitoring Resource Usage" on page 167
- "Monitoring Deployed Virtual Machines" on page 168

Monitoring the Dashboard

The Dashboard page provides statistics on systems and usage of resources and Stage Manager objects.

The **System Statistics** column includes this information:

- Graphical view of virtual machine deployment activity for the current month.
- Consumed and reserved CPU and memory resources.
- Usage statistics for services, configurations, and published templates.
- Consumed and total disk space for storage.
- Number of virtual machines (except virtual routers) under Stage Manager control.
- Average disk space for each virtual machine.

  This entry assumes you are using dedicated VMFS disk space for Stage Manager virtual machines.

The **My Stage Manager** column includes this information:

- Number of services, lifecycle and archived configurations, and lifecycle and archived virtual machines you created or can access.
- Number of deployment leases for lifecycle configurations and templates that expire in one week.
- Number of storage leases for lifecycle configurations, archived configurations, and templates that expire in one week.

For information about leases, see "Reviewing the Resource Cleanup Tab" on page 103.

Monitoring the Activity Log

You can view the activity log to monitor time-consuming (asynchronous) tasks or jobs that do not require immediate completion. Stage Manager administrators can see all entries. Service users can see entries about their own operations.

Examples of asynchronous operations are creating a configuration, promoting or demoting a configuration, deploying a configuration, and setting a revert point for a configuration.

Use the **Activity Log** link in the left pane to access the logs.

On this page, a table presents this information:

- Status noting the success, failure, or in progress status of a job.

  A failed job includes a short description in the **Details** column.
- Job ID.
- Owner of the action.
- Type of activity (for example, Configuration or Machine).
- Details and debugging information in the **Operation** column.

From the table, you can access links to details on a particular operation. If a failure occurs, the details include information about that failure.

Viewing Log Details

If an operation fails, you can access more information about that error.

To view details on an operation in the activity log

From the Activity Log page, click a link in the **Operation** column to access details on that operation.

Monitoring Resource Usage

Stage Manager administrators can monitor resource usage using resource pool, service, and stage data. A resource pool is a logical structure that allows delegation of control over the resources of a host. Resource pools compartmentalize all resources in a cluster. You can create multiple resource pools as direct children of a host or cluster and configure them. You can then delegate control over them to other individuals or organizations. The managed resources are CPU and memory from a host or cluster. Virtual machines execute in and draw their resources from resource pools.

Use the **Resource Usage** link in the left pane to access resource data on the **Resource Pools** tab and **Services and Stages** tab.

The **Resource Pools** tab presents this information:

- Name of the resource pool.
- Service associated with the resource pool.
- CPU and memory consumption:
  - **Used** – Dynamic amount consumed by virtual machines in this resource pool or any child resource pool.

    The value accounts for all deployed and powered on virtual machines, not just the ones under Stage Manager control.
  - **Reserved** – Amount that Stage Manager reserves from this resource pool for running virtual machines in both this resource pool and any child resource pool.
  - **Total** – Static upper limit on usage. The value is based on the upper limit configured for this resource pool and for any parent resource pool.

The **Services and Stages** tab presents this information:

- Names of the service and stages in the service.
- Resource pool associated with a stage.

- CPU and memory consumption:
  - **Used** – Dynamic amount consumed by virtual machines in this stage.

    The value accounts only for virtual machines in a stage under Stage Manager control.
  - **Reserved** – Amount that Stage Manager reserves from this resource pool for running virtual machines in both the resource pool for this stage and any child resource pool.
  - **Total** – Static upper limit on usage. The value is based on the upper limit configured for the resource pool for this stage, and for any parent resource pool.

Monitoring Deployed Virtual Machines

Stage Manager administrators can monitor all deployed virtual machines in Stage Manager.

Use the **Deployed VMs** link in the left pane to view details on the deployed virtual machines. You can also access deployed machines in the **Hosts** tab (see "Highlights of the Hosts Tab" on page 70) by moving the pointer over a host name and choosing **Deployed VMs** from the menu.

On this page, a table includes this information:

- Access to the virtual machine console through the thumbnail icon.
- Name of the virtual machine includes a pop-up menu to view the virtual machine console or undeploy the virtual machine.
- Status whether the virtual machine is deployed.
- Service, stage, and configuration in which the virtual machine resides.

  A dash in the **Configuration** column indicates the virtual machine is a template.
- IP address of the virtual machine or DHCP specification.
- External IP address for the virtual machine if it runs in fenced mode.

  See Appendix C, "Network Fencing," on page 181.
- Template that serves as the basis of the virtual machine.

  This is useful when you plan on retiring a template and need to evaluate its usage. When a template is removed for a configuration or is deployed, a dash appears in the **Template** column.

- Name of the ESX Server host.
- Person who deployed the virtual machine.
- Date and time of deployment.
- Creator of the virtual machine.
- Messages.

Appendixes

Client and Browser Support

A

The following tables list browsers and operating systems for client machines accessing the Stage Manager Web console.

Table A-1 specifies support for 32-bit operating systems.

Table A-1. 32-Bit Client Operating System and Web Browser Support

Operating System			IE 5.5	IE 6.0	IE 7.0	Firefox 1.5	Firefox 2.0
Microsoft Windows	Vista		N/A	N/A	Yes	Experimental	Experimental
	Server 2003 Standard Edition	SP1	No	Yes	Yes	Yes	Yes
		SP2	No	Yes	Yes	Yes	Yes
		R2	No	Yes	Yes	Yes	Yes
	Server 2003 Enterprise Edition	SP1	No	Yes	Yes	Yes	Yes
		SP2	No	Yes	Yes	Yes	Yes
		R2	No	Yes	Yes	Yes	Yes
	XP Professional	SP1	No	Yes	Yes	Yes	Yes
		SP2	No	Yes	Yes	Yes	Yes
	2000 Server	SP3	Yes	Yes	No	No	No
		SP4	Yes	Yes	No	No	No

Table A-1. 32-Bit Client Operating System and Web Browser Support (Continued)

Operating System			IE 5.5	IE 6.0	IE 7.0	Firefox 1.5	Firefox 2.0
	2000 Advanced Server	SP3	Yes	Yes	No	No	No
		SP4	Yes	Yes	No	No	No
Red Hat Enterprise Linux	2.1 AS/ES/WS		No	No	No	Yes	Yes
	3 AS/ES/WS		No	No	No	Yes	Yes
	4 AS/ES/WS		No	No	No	Yes	Yes
	5 AS/ES/WS		No	No	No	Yes	Yes
SUSE Linux	Enterprise Server 8 (SLES)	SP4	No	No	No	Yes	Yes
	Enterprise Server 9 (SLES)	SP3	No	No	No	Yes	Yes
	Enterprise Server 10 (SLES)		No	No	No	Yes	Yes

Table A-2 specifies support for 64-bit operating systems.

Table A-2. 64-Bit Client Operating System and Web Browser Support

Operating System			IE 5.5	IE6.0	IE 7.0	Firefox 1.5	Firefox 2.0
Microsoft Windows	Vista		N/A	N/A	Yes	Experimental	Experimental
	Server 2003 Standard Edition	SP1	No	Yes	Yes	No	Yes
		SP2	No	Yes	Yes	No	Yes
		R2	No	Yes	Yes	No	Yes
	Server 2003 Enterprise Edition	SP1	No	Yes	Yes	No	Yes
		SP2	No	Yes	Yes	No	Yes
		R2	No	Yes	Yes	No	Yes

Table A-2. 64-Bit Client Operating System and Web Browser Support (Continued)

Operating System			IE 5.5	IE6.0	IE 7.0	Firefox 1.5	Firefox 2.0
	XP Professional	SP1	No	Yes	Yes	No	No
		SP2	No	Yes	Yes	No	No
Red Hat Enterprise Linux	3 AS/ES/WS	Update 7	No	No	No	Yes	Yes
		Update 8	No	No	No	Yes	Yes
	4 AS/ES/WS	Update 2	No	No	No	Yes	Yes
		Update 3	No	No	No	Yes	Yes
		Update 4	No	No	No	Yes	Yes
SUSE Linux	Enterprise Server 9 (SLES)	SP3	No	No	No	Yes	Yes
	Enterprise Server 10 (SLES)	RTM	No	No	No	Yes	Yes

Guest Operating System Support

B

The following tables list uniprocessor (UP) and multiprocessor (MP) operating systems, and the SIDgen and Microsoft Sysprep components for guest customization.

Although Stage Manager uses guest customization on both Windows and UNIX-based guest operating systems to configure network settings, these tables address only the Windows-specific support for the SIDgen and Microsoft Sysprep components of guest customization.

Table B-1 specifies support for 32-bit operating systems.

Table B-1. 32-Bit Guest Operating Systems

Operating System			UP	MP	SIDgen Support (Windows only)	Microsoft Sysprep Support (Windows only)
Microsoft Windows	Server 2008	RTM	Yes	Yes	No	Yes
	Vista Ultimate	RTM	Yes	Yes	No	Yes
	Server 2003 Standard Edition	SP1	Yes	Yes	Yes	Yes
		SP2	Yes	Yes	Yes	Yes
		R2	Yes	Yes	Yes	Yes
	Server 2003 Enterprise Edition	SP1	Yes	Yes	Yes	Yes

Table B-1. 32-Bit Guest Operating Systems (Continued)

Operating System			UP	MP	SIDgen Support (Windows only)	Microsoft Sysprep Support (Windows only)
		SP2	Yes	Yes	Yes	Yes
		R2	Yes	Yes	Yes	Yes
	Server 2003 Web Edition	SP1	Yes	Yes	Yes	Yes
	XP Professional	SP1	Yes	No	Yes	Yes
		SP2	Yes	No	Yes	Yes
	2000 Server	SP3	Yes	Yes	Yes	Yes
		SP4	Yes	Yes	Yes	Yes
	2000 Advanced Server	SP3	Yes	Yes	Yes	Yes
		SP4	Yes	Yes	Yes	Yes
	2000 Terminal Services	SP3	Yes	Yes	Yes	Yes
		SP4	Yes	Yes	Yes	Yes
	NT 4.0 Server	SP6a	Yes	No	Yes	No
Red Hat Enterprise Linux	2 AS/ES/WS	Update 1	Yes	Yes	N/A	N/A
	3 AS/ES/WS	Update 7	Yes	Yes	N/A	N/A
		Update 8	Yes	Yes	N/A	N/A
	4 AS/ES/WS	Update 2	Yes	Yes	N/A	N/A
		Update 3	Yes	Yes	N/A	N/A
		Update 4	Yes	Yes	N/A	N/A

Table B-1. 32-Bit Guest Operating Systems (Continued)

Operating System			UP	MP	SIDgen Support (Windows only)	Microsoft Sysprep Support (Windows only)
	5 AS/ES/WS		Yes	Yes	N/A	N/A
SUSE Linux	Enterprise Server 9 (SLES)	SP3	Yes	Yes	N/A	N/A
	Enterprise Server 10 (SLES)	Novell OES SP1	Yes	Yes	N/A	N/A
Solaris	10	Update 3	Yes	Yes	N/A	N/A

Table B-2 specifies support for 64-bit operating systems.

Table B-2. 64-Bit Guest Operating Systems

Operating System			UP	MP	SIDgen Support (Windows only)	Microsoft Sysprep Support (Windows only)
Microsoft Windows	Server 2003 Enterprise Edition 64-bit	SP1	Yes	Yes	No	Yes
		SP2	Yes	Yes	No	Yes
		R2	Yes	Yes	No	Yes
	Server 2003 Standard Edition 64-bit	SP1	Yes	Yes	No	Yes
		SP2	Yes	Yes	No	Yes
		R2	Yes	Yes	No	Yes
	XP Professional x64 Edition	SP1	Yes	Yes	No	Yes
		SP2	Yes	Yes	No	Yes

Table B-2. 64-Bit Guest Operating Systems (Continued)

Operating System			UP	MP	SIDgen Support (Windows only)	Microsoft Sysprep Support (Windows only)
Red Hat Enterprise Linux	3 64-bit	Update 7	Yes	Yes	N/A	N/A
		Update 8	Yes	Yes	N/A	N/A
	4 64-bit	Update 2	Yes	Yes	N/A	N/A
		Update 3	Yes	Yes	N/A	N/A
		Update 4	Yes	Yes	N/A	N/A
SUSE Linux	Enterprise Server 9, 64-bit (SLES)	SP3	Yes	Yes	N/A	N/A
	Enterprise Server 10, 64-bit (SLES)	RTM	Yes	Yes	N/A	N/A
Solaris	10	Update 3	Yes	Yes	N/A	N/A

Network Fencing

C

Stage Manager uses network fencing, an architecture that isolates or "fences" virtual machine configurations while allowing full network access. Fencing enables you to work with live instances of the same configuration on the same network.

For example, when you want to have concurrent development or testing on the same configuration, you can duplicate or clone the configuration and avoid any IP or MAC address collision with this technology.

This appendix includes these topics:

- "When to Fence Configurations" on page 181
- "Fencing Overview" on page 182
- "Viewing Virtual Switches for Fences" on page 186

When to Fence Configurations

Typically, you want to enable network fencing under these circumstances:

- You have a configuration with one or more servers, and you anticipate cloning the configuration numerous times.
- You have a configuration involving a difficult and complex setup, and cloning the configuration is an easier route than repeating the setup.

With fencing, engineers can run multiple, independent tests on a configuration deployed multiple times. Fencing is particularly useful when a developer needs to examine a bug without interrupting or stopping ongoing testing on a configuration. Stage Manager also enables you to reproduce the bug at a later time if the developer is unavailable.

From a performance perspective, network fencing impacts the traffic flow between modules. Fencing requires a slightly higher number of resources on the host, such as memory, CPU, networking, and virtual machine slots. If you enable fencing but never use it, these resources do not come into play.

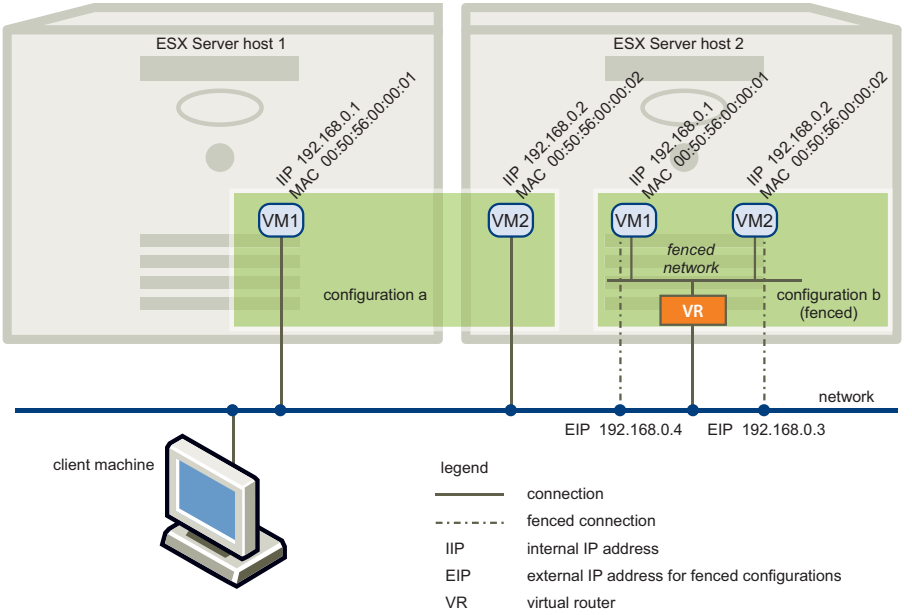
Fencing Overview

Virtual machines in a configuration have preconfigured (internal) IP addresses. When you deploy virtual machines in fenced mode, Stage Manager assigns a unique external IP address to each of these machines. Through these external addresses, virtual machines both inside and outside the fence can communicate with each other.
Stage Manager uses a virtual machine called a virtual router to route packets between these virtual machines. Stage Manager configures the virtual router when you deploy a fenced configuration and deletes it when you undeploy the configuration.

NOTE When you deploy a configuration in fenced mode with the Block Traffic In and Out option, Stage Manager does not create a virtual router or assign external IP addresses. See "Fencing Options" on page 183.

Figure C-1 illustrates configurations without fencing and with fencing.

Figure C-1. Configuration A (Without Fencing) and Configuration B (With Fencing)



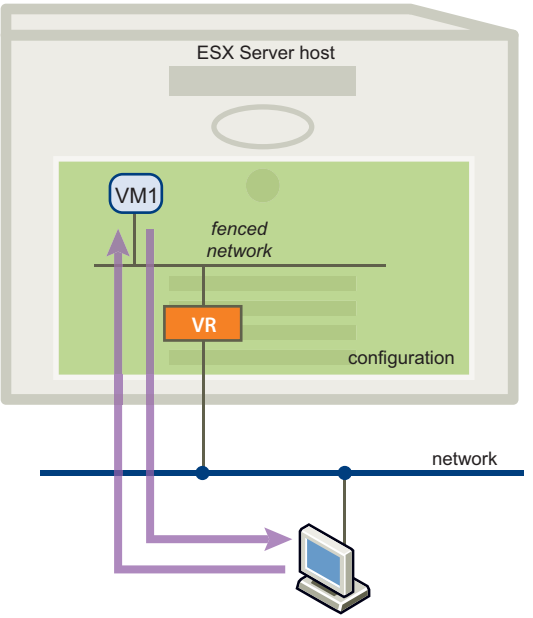
Fencing a configuration does not require any changes to its virtual machines. Within a fenced configuration, virtual machines continue to use preassigned IP addresses to communicate with each other. For more information on IP address allocation in fenced configurations, see "Using Static IP and DHCP Networking" on page 92.

Fencing Options

You can deploy fenced configurations in three ways:

- **Allow Traffic In and Out** – Virtual machines can communicate with machines outside the fence and machines outside the fence can communicate with virtual machines in the fenced configuration. See Figure C-2.

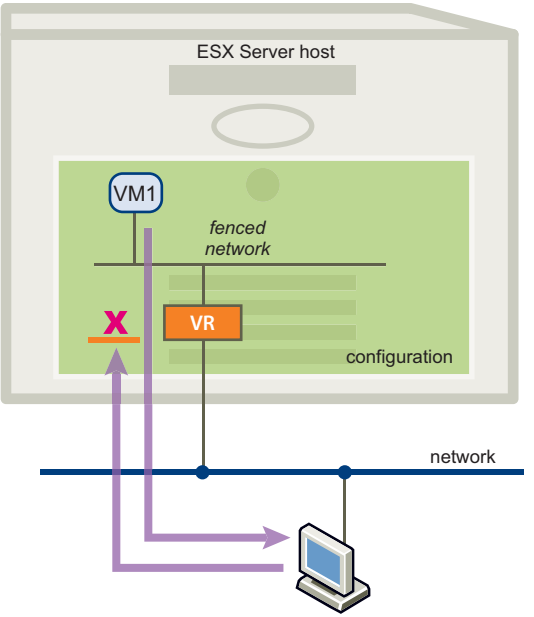
Figure C-2. Allow Traffic In and Out Fencing Mode



- **Allow Traffic Out** – Virtual machines in a fenced configuration can initiate communication to machines outside the fence and can receive messages back on the same connection. Machines outside the fence cannot initiate communication to virtual machines in the fenced configuration.

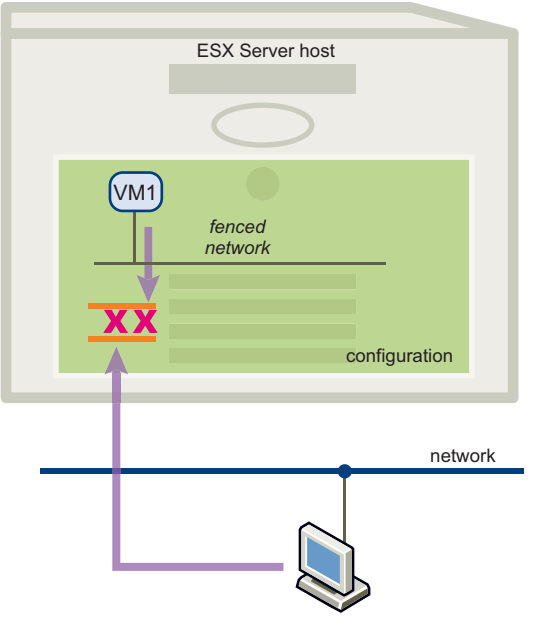
  This option is useful when virtual machines need to obtain data or execute code outside the fence (as seen with Web services or databases) but do not want to receive messages that may disrupt testing. See Figure C-3.

Figure C-3. Allow Traffic Out Fencing Mode



- **Block Traffic In and Out** – Network traffic does not travel across the fence. Virtual machines in a fenced configuration cannot communicate with machines outside of the fence, and machines outside the fence cannot communicate with virtual machines in the fenced configuration. When you deploy a fenced configuration with this option, Stage Manager does not create a virtual router or assign external IP addresses. See Figure C-4.

Figure C-4. Block Traffic In and Out Fencing Mode



This option is useful in these circumstances:

- You are testing software viruses that need to remain isolated from the network.
- You are testing a client-server application in isolation.

Processor Type Incompatibility

Deploying a configuration in fenced mode hosts all the virtual machines on a single ESX Server host. You must have a host connected to the datastore where the templates that serve as the basis of this configuration reside on. The host must have sufficient resources, such as memory, slots, and fences.

If you deploy a configuration, perform an operation which saves the state of the configuration (for example, suspend or capture to library), and redeploy the configuration with fencing (which requires hosting all virtual machines on the same physical machine), a situation could come up where the only hosts available are ones with incompatible processor types. The captured memory expects a particular processor type.

To address this situation, deploy the configuration without fencing, undeploy it without saving the memory state (use the **Turn Off** deployment setting in the User Preferences page or the **Undeploy - Discard State** pop-up menu), and redeploy the configuration.

If deploying a configuration without fencing is not an option, reset the MAC address of each virtual machine to remove the saved state, and redeploy the configuration. See "Changing MAC Addresses" on page 161.

Viewing Virtual Switches for Fences

You can use the VI Client in the ESX Server host to see the `<system name>_vs<fence ID>` virtual switches or networks that Stage Manager creates for each fence.

To view virtual switches for fences

1 Navigate to the **Configuration** tab of the VI Client.

2 Click the **Networking** link in the **Hardware** list to view virtual switches.

A sample virtual switch is `DemoSystem_vs002`.

For information about using the VI Client, see VMware Infrastructure 3 documentation.

CAUTION Do not connect the virtual switches that Stage Manager creates to an external network. Stage Manager needs these virtual switches for deploying fenced configurations.

Glossary

A

Active Directory
A Microsoft directory service that stores information about users, computers, and the Windows operating system. Active Directory enables administrators to set security policies, control resources, and deploy programs across an enterprise.

You can point Stage Manager at a Microsoft Active Directory domain or domain controller to enable an entire company (or subset) of users.

ActiveX Control
An object that supports programmatic interfaces.

Stage Manager prompts you to install the remote console ActiveX Control when you initially access a virtual machine console.

activity log
A display of status information about asynchronous Stage Manager tasks or jobs that do not require immediate completion.

administrator
See service administrator, Stage Manager administrator.

agent
See Stage Manager agent.

archive
(n.) The area of Stage Manager for virtual configurations that you need to preserve (for example, an application prior to a new integration project).

From the archive, you can perform operations such as exporting configurations to the network, cloning configurations to a stage of the service, and transferring the configuration to another service.

(v.) To store a configuration in the service archive.

available
Indicates an ESX Server host is set up but some condition exists in VirtualCenter that prevents Stage Manager from using the host.

B

base disk

The original virtual hard disk from which a virtual machine is derived. Virtual machines creates by linked clones in Stage Manager are comprised of a base disk and chain of delta disks that store the changes made to the original. This "referential provisioning" process addresses the potential disk consumption difficulties that come with virtual machine proliferation.

When you make a linked clone of a virtual machine, both the clone and the original use the same base disk. When you make a deep clone of a virtual machine, Stage Manager consolidates the original base disk and its delta disks to create a new base disk. In this case, the original disks remain unchanged.

See also chain length, clone, delta disk.

C

chain length

The number of delta disks associated with a virtual machine. The chain length indicates how distributed a virtual machine image is across the directories of a datastore. *See also* base disk, consolidate, delta disk.

clone

See linked clone, full clone.

cluster

A server group in the virtual environment.

compute resource

A compute resource is the cluster or host providing compute power to a resource pool. The compute resource represents the sum of all CPU and memory of all hosts under it.

configuration

A group of virtual machines that Stage Manager controls as a unit.

Stage Manager configurations are comprised of the components of the IT applications that Stage Manager manages. Each configuration resides in a stage of a service and contains one or more virtual machines. Stage Manager can replicate these configurations on demand.

console

See Stage Manager Web console, virtual machine console.

consolidate
To combine an existing base disk and its chain of delta disks into a single base disk. Use consolidation to move a virtual machine or configuration to a new datastore.

See also base disk, chain length, delta disk.

D

datastore
Virtual representation of combinations of underlying physical storage resources in the datacenter. A datastore is the storage location (for example, a physical disk, a RAID, or a SAN) for virtual machine files.

Stage Manager uses VMFS datastores for virtual machines and NFS datastores for media files and virtual machines.

delta disk
"Differencing" disk created during the cloning process. A virtual machine created as a linked clone consists of a base disk, plus a chain of one or more delta disks that store the differences between the cloned virtual machine and the original virtual machine. *See also* base disk, chain length, clone.

demote
To move a configuration into an earlier stage of the service lifecycle.

deploy
To register a virtual machine or configuration on an ESX Server host. This host must have the proper CPU type, CPU numbers, and 64-bit capability if necessary. Stage Manager manages the selection of hosts when deploying virtual machines and configurations.

deployment lease
The amount of time a template or configuration is deployed before Stage Manager is scheduled to undeploy it.

DHCP (Dynamic Host Configuration Protocol)
A communications protocol that enables dynamic addressing. The software relieves administrators of the task of assigning an IP address to each device that connects to a network.

DNS (Domain Name System)
An Internet data query service that translates host names into IP addresses. Also called "Domain Name Server" or "Domain Name Service."

DRS (VMware Distributed Resource Scheduler)
See VMware Distributed Resource Scheduler (DRS).

E

eject CD
To eject the CD after the **Insert CD** operation in the virtual machine console.

eject floppy
To eject the floppy file after the **Insert Floppy** operation in the virtual machine console.

enabled
User flag to mark an object as available for use.

ESX Server
See VMware ESX Server.

export
To move a configuration or virtual machine to an SMB share.

external IP address
A unique IP address temporarily assigned to each virtual machine deployed with network fencing. Through these external addresses, virtual machines both inside and outside the fence can communicate with each other.

Stage Manager assigns external IP addresses when deploying clones. This is different from the internal IP addresses that remain static across cloning activity.

F

fencing
An architecture that isolates or "fences" virtual machine configurations while allowing full network access. Fencing enables you to work with live instances of identical configurations on the same network simultaneously.

force delete
To forcefully delete a virtual machine when an ESX host failure prevents the Stage Manager administrator from deleting the virtual machine.

The operation cleans the virtual machine from the Stage Manager database but not from the VirtualCenter inventory. You can manually remove the virtual machine from the VirtualCenter inventory.

force undeploy
To forcefully undeploy a virtual machine or configuration after situations such as an ESX Server host goes permanently offline or someone manually removes a virtual machine from VirtualCenter inventory.

FQDN (fully qualified domain name)
The name of a host, including both the host name and the domain name. For example, the FQDN of a host named `esx1` in the domain `vmware.com` is `esx1.vmware.com`.

full clone
(n.) Full copy of the consolidated sum of delta disks and base disk of a virtual machine. Full cloning takes a significantly longer time than linked cloning.

(v.) To make a full copy of the consolidated sum of delta disks and base disk of a virtual machine.

See also linked clone, base disk.

G

guest customization
Stage Manager customization of the network settings inside the guest operating system of a virtual machine. These settings include the machine name, IP settings, and Security Identifier (SID) for Windows guest operating systems.

Stage Manager creates a package with the guest customization tools. When you power on a virtual machine for the first time, Stage Manager copies the package, runs the tools, and deletes the package from the virtual machine.

Without guest customization, the virtual machine uses the settings of the template it is based on. This situation can create machine name and network conflicts when you deploy more than one virtual machine created from the same template at the same time.

guest operating system
An operating system that runs inside a virtual machine.

H

host
The physical computer on which the virtual machines managed by Stage Manager reside.

I

import
To copy a configuration from an SMB share, or to copy a virtual machine from an SMB share or VirtualCenter.

insert CD

To associate an ISO image in the Stage Manager media library with a virtual machine. The ISO image appears within the virtual machine as if you inserted a CD.

insert floppy

To associate a floppy image in the Stage Manager media library with a virtual machine. The floppy image appears within the virtual machine as if you inserted a disk.

internal IP address

A preconfigured IP address for a virtual machine in a configuration.

Internal IP addresses remain static across cloning activity.

IP pool

A range of IP addresses set aside for use by Stage Manager.

ISO

An exact representation of a CD or DVD, including its content and logical format.

L

lease

See deployment lease, storage lease.

lifecycle

The area of Stage Manager that displays the path to production of a service. The stages that comprise this path organize the lifecycle, and each stage can contain one or more configurations.

linked clone

(n.) A duplicate of a virtual machine that uses the same base disk as the original combined with a chain of delta disks to keep track of the differences between the original and the clone.

(v.) To generate a "quick" copy by creating a delta disk instead of copying an entire virtual hard disk. This operation addresses virtual machine proliferation by using "referential provisioning," a process that involves storing new changes but referring back to a chain of delta disks. For each clone, Stage Manager freezes the original delta disk and creates a new one.

See also full clone, base disk, chain length.

LDAP (Lightweight Directory Access Protocol)
A protocol that enables you to locate organizations, individuals, or other resources from a server.

M

MAC (Media Access Control) address
A hardware address that identifies each virtual or physical network adapter.

media store
A directory for media files on NFS datastores.

Microsoft Sysprep
A Microsoft utility for changing the SID of operating systems. You can build a Microsoft Sysprep package for guest customization in Stage Manager.

See Security Identifier (SID).

N

network fencing
See fencing.

NIC (Network Interface Card)
An expansion board that provides a dedicated connection between a computer and a network. Also called a "network adapter."

NFS (Network File System)
A protocol that supports sharing of files, printers, and other resources. Stage Manager can use NFS datastores for media and virtual machine storage.

P

portgroup
A construct for configuring virtual network options such as bandwidth limitations and VLAN tagging policies for each member port. Virtual networks connected to the same portgroup share network policy configuration.

power off
The virtual equivalent of powering down a physical machine.

power on
The virtual equivalent of powering on a physical machine.

prepare
To set up a host for use in the Stage Manager environment. *See* Prepare Hosts wizard.

Prepare Hosts wizard
A wizard that prepares ESX Server hosts for Stage Manager use after attaching a resource pool. The wizard installs the Stage Manager agent on the hosts and collects information on user names, passwords, virtual switches, and datastores.

privilege
Authorization to perform a specific action or set of actions on a managed object or group of managed objects.

promote
To move a configuration into a later stage of the service lifecycle.

publish
To make a Stage Manager template available for use in creating configurations.

R

ready
Indicates an ESX Server host is available for use.

Certain host states are documented that affect this status.

referential provisioning
A process for linked clones that involves storing new changes but referring back to a chain of delta disks. For each clone, Stage Manager freezes the original delta disk and creates a new one.

A linked clone operation generates a "quick" copy by creating a delta disk instead of copying an entire virtual hard disk.

reset
To restart a virtual machine and clear the machine state. This operation can occur at the virtual machine or configuration level.

resource pool
A division of computing resources used to manage allocations between virtual machines.

resume
To return a virtual machine or configuration to operation from its suspended state. When you resume a suspended virtual machine or configuration, all applications are in the same state they were when the virtual machine or configuration was suspended. *See also* suspend.

revert
To return the virtual machine to an earlier state captured in a snapshot.

revert point
The state of a virtual machine as captured by a snapshot at a specific point in time. You can restore the status of an active virtual machine to its revert point.

S

SAN (storage area network)
A large-capacity network storage device that can be shared among multiple VMware ESX Server hosts. Shared storage (for example, SAN or NAS) is required for VMotion.

Security Identifier (SID)
A unique name in a Microsoft Windows environment used to identify an object.

See Microsoft Windows documentation.

service
An IT deliverable (for example, an email service for the larger organization). A service is enabled by one or more systems working together in production. Stage Manager organizes all systems involved in a service together, and separates them into stages.

See also lifecycle, stage.

service administrator
An individual responsible for the delivery of a particular service to the larger organization. The service administrator can work with configurations in all stages of the particular service, but cannot access services outside his administration.

service user
A developer or another user who has access to a limited set of stages in a particular service, but does not have permission to alter the production infrastructure.

shut down
To shut down the operating system from within the guest.

SID
See Security Identifier (SID).

SIDgen
A tool packaged with Stage Manager that changes the SID for virtual machines.

SMB (Server Message Block)
A network protocol for exchanging files between computers. You can use SMB with Windows and Linux operating systems.

SMP (Symmetric Multiprocessing)
The technology that enables you to assign two virtual processors to a virtual machine on any host machine that has at least two logical processors.

SMTP (Simple Mail Transfer Protocol)
A protocol that facilitates email transmissions between servers.

SMTP Server
A system running email server software that accepts email from within your enterprise. Stage Manager must connect to an SMTP server to send email alerts.

snapshot
A reproduction of the virtual machine or configuration just as it was when you took the snapshot, including the state of the data on all the virtual disks and power state (on, off, or suspended).

Once set, Stage Manager stores the snapshot with the configuration or virtual machine image. Only one snapshot is active at a time. The most recent snapshot replaces the previous one.

You can revert the configuration or virtual machine to a snapshot. If you undeploy a virtual machine and deploy it, the snapshot remains.

SSL (Secure Sockets Layer)
A Web server uses this protocol to establish a secure connection with the browser.

stage
Containers within services that store virtual machine configurations.

Stages reflect the IT workflow and organize the path to production of a particular service.

Stage Manager
See VMware Stage Manager.

Stage Manager administrator
The highest-level administrator who is likely to map to the VMware Infrastructure administrator role in most organizations. The responsibilities of the Stage Manager administrator span the entire Stage Manager installation. Only Stage Manager administrators can attach resources, create services, and manage templates.

Stage Manager agent
Software installed on the ESX Server host that facilitates a connection to the Stage Manager Server system. Stage Manager automatically installs the agent during the process of preparing a host.

Stage Manager Server
Component of the Stage Manager environment installed with the Stage Manager Server software.

Stage Manager Web console
A browser-based interface that provides access to all Stage Manager operations.

storage lease
The amount of time an unused template or configuration exists on a datastore before Stage Manager deletes it or marks it for deletion. This affects only unpublished templates.

suspend
To save the current state of a running virtual machine or configuration. To return a suspended virtual machine or configuration to operation, use the resume feature. *See also* resume.

swap CD
To eject the CD from the virtual machine console and insert a new CD at the same time.

swap floppy
To eject the floppy from the virtual machine console and insert a new floppy at the same time.

Sysprep
See Microsoft Sysprep.

T

TCP/IP (Transmission Control Protocol/Internet Protocol)
The de facto language of the Internet designed to enable communication between networks regardless of the computing technologies that they use.

TCP connects hosts and provides a reliable exchange of data streams with guaranteed delivery. IP specifies the format of packets and handles addressing.

template
See virtual machine template.

U

undeploy

To unregister a virtual machine or configuration from an ESX Server host. This operation makes the resources associated with that virtual machine available for use by the rest of the virtual environment.

unprepare

To remove an ESX Server host from use in the Stage Manager environment. This operation uninstalls the Stage Manager agent and removes the default portgroup.

user

See service user.

V

VirtualCenter

See VMware VirtualCenter (VirtualCenter), VirtualCenter Server.

virtual machine template

A master image of a virtual machine. This typically includes a specified operating system and virtual counterparts to hardware components. A template can include an installed guest operating system and a set of applications.

virtual machine console

An interface to a virtual machine within the larger Stage Manager Web console. Use the virtual machine console to run programs within it or modify guest operating system settings. Stage Manager provides operations ranging from the installation of VMware Tools to media file activity for the guest operating system to snapshots of virtual machines.

VirtualCenter Server

A service that acts as a central administrator for VMware servers connected on a network. This service directs actions on the virtual machines and the virtual machine hosts. VirtualCenter Server is the working core of VirtualCenter. *See also* VMware VirtualCenter (VirtualCenter).

virtual machine disk (.vmdk)

A file or set of files that appears as a physical disk drive to a guest operating system. These files can be on the host machine or on a remote file system.

virtual hardware

The devices that make up a virtual machine. The virtual hardware includes the virtual disk, removable devices such as the DVD-ROM/CD-ROM and floppy drives, and the virtual Ethernet adapter.

virtual machine
A virtualized x86 PC environment in which a guest operating system and associated application software can run. Multiple virtual machines can operate on the same host system concurrently.

virtual machine configuration file (.vmx)
A file containing a virtual machine configuration. This `.vmx` file exists after you create a virtual machine. The file contains details about the virtual hardware and other configuration areas.

virtual router
A virtual machine that specifically routes packets between other virtual machines. Stage Manager configures the virtual router when you deploy a fenced configuration and deletes it when you undeploy the configuration.

Stage Manager does not create a virtual router for the Block Traffic In and Out fencing mode.

virtual switch
A virtualized network switch used by ESX Server to manage traffic between virtual machines, the service console, and the physical network adapters on the ESX Server machine.

VMFS (Virtual Machine File System)
A file system that is optimized for storing virtual machines. One VMFS partition is supported per SCSI storage device or LUN. Different versions of ESX Server might use different versions of VMFS. For example, VMFS3 was introduced with ESX Server 3.

VMkernel
In ESX Server, a high-performance hypervisor that occupies the virtualization layer and manages most of the physical resources on the hardware, including memory, physical processors, storage, and networking controllers.

VMotion
A feature that enables you to move running virtual machines from one ESX Server system to another without interrupting service. It requires licensing on both the source and target hosts. VMotion is activated by the VirtualCenter agent, and VirtualCenter Server centrally coordinates all VMotion activities. *See also* VirtualCenter Server.

.vmx
See virtual machine configuration file (.vmx).

VMware Distributed Resource Scheduler (DRS)

A feature that intelligently and continuously balances virtual machine workloads across your ESX Server hosts using the VirtualCenter and VMotion products. VMware DRS detects when virtual machine activity saturates an ESX Server host and triggers automated VMotion live migrations, moving running virtual machines to other ESX Server nodes so that all resource commitments are met.

VMware ESX Server

A robust, production-proven virtualization layer run on physical servers that abstracts processor, memory, storage, and networking resources into multiple virtual machines. ESX Server is a component of VMware Infrastructure.

Stage Manager requires ESX Server hosts.

VMware High Availability (VMware HA)

An optional feature that supports distributed availability services in an environment that includes ESX Server and VirtualCenter. If you configured VMware HA and one of the hosts managed by VirtualCenter Server goes down, all virtual machines on that host are immediately restarted on another host. *See also* DRS (VMware Distributed Resource Scheduler), VirtualCenter Server.

VMware Infrastructure

A software suite, including ESX Server and VirtualCenter, that virtualizes servers, storage, and networking and enables multiple unmodified operating systems and their applications to run independently in virtual machines while sharing physical resources. The suite delivers comprehensive virtualization, management, resource optimization, application availability, and operational automation capabilities. *See also* VMware VirtualCenter (VirtualCenter), VMware ESX Server.

VMware Infrastructure Client (VI Client)

A user interface that runs locally in a Windows machine and provides access to the virtual machine's display. VI Client runs on a networked machine that need not be the same machine as the VirtualCenter Server.

VMware Remote MKS Plugin

An application that embeds in the browser to facilitate interaction with a remote machine. This application sends mouse, keyboard, and screen data back and forth across the network.

VMware Stage Manager

Software that organizes IT deliverables in the enterprise software lifecycle into services. These services are broken into stages that span development and testing through production. Stage Manager increases IT service availability, accelerates

response to configuration changes, promotes compliance with regulatory or workflow processes, and promotes efficient use of storage.

Stage Manager requires the VMware Infrastructure product.

VMware Tools

A suite of utilities and drivers that enhances the performance and functionality of your guest operating system. Key features of VMware Tools include some or all of the following, depending on your guest operating system: an SVGA driver, a mouse driver, the VMware Tools control panel, and support for such features as shared folders, drag-and-drop in Windows guests, shrinking virtual disks, time synchronization with the host, VMware Tools scripts, and connecting and disconnecting devices while the virtual machine is running.

Guest customization in Stage Manager requires VMware Tools.

VMware VirtualCenter (VirtualCenter)

A software component of VMware Infrastructure for deploying and managing virtual machines across the datacenter. With VirtualCenter, datacenters can instantly provision servers, globally manage resources, and eliminate scheduled downtime for hardware maintenance. *See also* VirtualCenter Server.

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